DECEMBER

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Medical and Dental Economics—*Warnshuis*
Cast Attachments for Bridgework—*Krause*
Blood Dyscrasias—*Lichtwitz*
Agranulocytic Angina—*Mark*
Diseases of Hematopoietic System—*Cody*
Three-Quarter Crown Construction—*Jones*
Why Fillings Fail—*Byrnes*
Occlusal Deformities—*Morton*
Medical Journalism—*Myers*
Advertising in Dental Journals—*McCall*
Activities of A.D.A.—*Ward*
Plastic and Oral Surgery—*Smith*

EDITORIALS

Christmas Seals
Public Relations Committee
Membership

COUNCIL ON DENTAL THERAPEUTICS

Accepted Dental Remedies
Remedies Not Admissible to A.D.R.

BUREAU OF PUBLIC RELATIONS

Radiodontia for Child
Patient—*Thompson*

CONTENTS

Frederick H. Lum, Jr., D.D.S. ..... Frontispiece

ORIGINAL COMMUNICATIONS

Pending Problems and Trends in Medical and Dental Economics.
By Frederick C. Warnshuis, M.D. 2091
Cast Attachments for Bridgework, with Special Reference to Vital Teeth.
By O. G. Krause, D.D.S. 2104
Blood Dyscrasias and Their Relationship to the Oral Cavity.
By Leopold Lichtwitz, M.D. 2112
Agranulocytic Angina—Its Oral Manifestations.
By Henry A. Mark, A.B., D.D.S. 2119
Dentistry in Relation to Diseases of the Hematopoietic System.
By Thomas F. Cody, D.M.D. 2122
An Effective Application of Mechanics in Three-Quarter Crown Construction: A New Principle and Its Technic.
By Walter E. Jones, D.D.S. 2134
Why Fillings Fail.
By Ralph R. Byrnes, D.D.S., F.A.C.D. 2144
Occlusal Deformities and a Method of Diagnosis as Applied to Operative Dentistry.
By Harry G. Morton, D.D.S. 2153
Presidential Address, Past Presidents' Club, 1934.
By C. Victor Vignes, D.D.S. 2168
Medical Journalism.
By J. Arthur Myers, M.D. 2169
Advertising in Dental Journals.
By John Oppie McCall 2174
A Review of Inlay Casting Technics.
By Herbert D. Coy, D.D.S. 2177
The More Progressive Activities of the A.D.A.
By Marcus L. Ward, D.D.S. 2185
Reconstructive Plastic and Oral Surgery.
By Arthur E. Smith, M.D., D.D.S. 2190
Pregnancy Epulis: Report of Case.
By E. K. Tratman, B.D.S., L.D.S. 2201
Variation in Technic for Removal of Impacted Lower Bicuspid.
By Harry J. Field, D.D.S., and Alfred A. Ackerman, A.B., B.Sc., D.D.S. 2202

EDITORIAL DEPARTMENT

The Christmas Seals.—The Public Relations Committee.—Membership.—Accepted Dental Remedies.—The Collection Rackets 2204-2212

Obituaries: John H. Cadmus, D.D.S. (1876-1934).—Thomas Crenshaw, Sr., D.D.S. (1858-1934) 2212-2215

Practice in Paragraphs 2215

COUNCIL ON DENTAL THERAPEUTICS

Accepted Dental Remedies 2217
Stopain—Not Admissible to Accepted Dental Remedies 2220
Topanol—Not Admissible to Accepted Dental Remedies 2221
Ziratol and Ipana Tooth Paste—Not Acceptable for Accepted Dental Remedies 2223
Dillard's Aspergum—Not Acceptable for A.D.R. 2226

BUREAU OF PUBLIC RELATIONS

Operative Radiodontia for the Child Patient.
By Walter S. Thompson, D.D.S. 2230
The Care of Children's Teeth 2237

CURRENT LITERATURE

Abstracts 2244

NEWS

State, General and Foreign News 2248

MISCELLANY

Book Reviews 2254

Important Action 2255

Announcements 2256

ADVERTISEMENTS

Index to Advertisements A-41
Classified Section A-31

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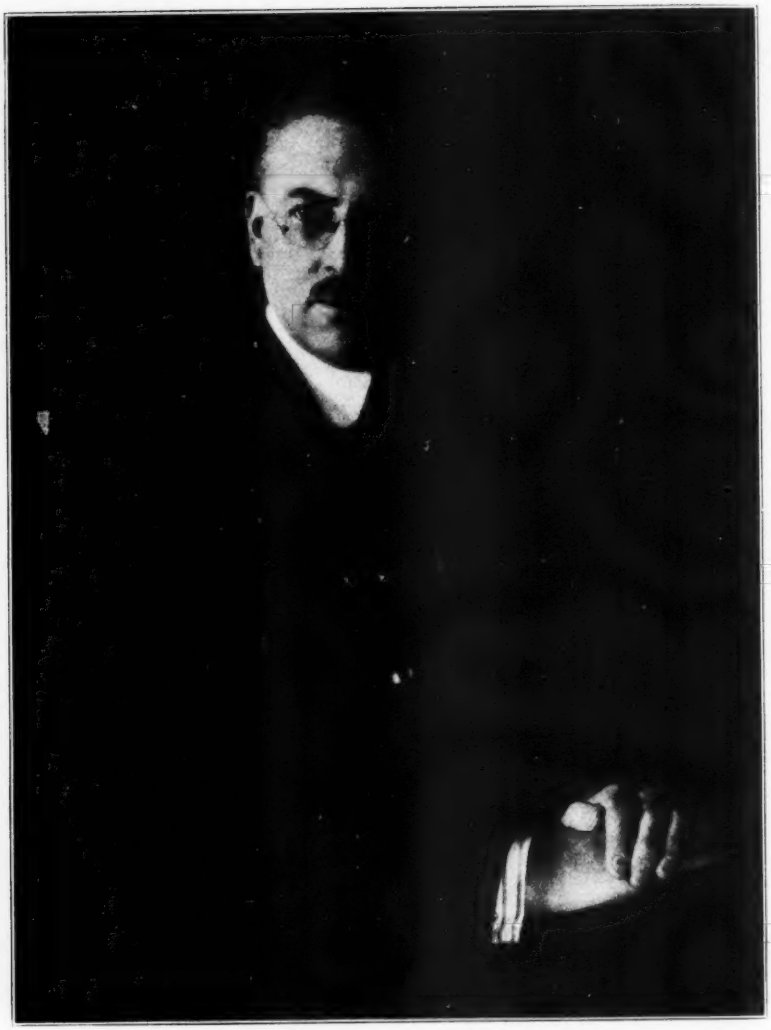

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UNIV. OF ILL.

THE JOURNAL
of the AMERICAN DENTAL ASSOCIATION

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Original Communications

PENDING PROBLEMS AND TRENDS IN MEDICAL AND DENTAL ECONOMICS*

By FREDERICK C. WARNSHUIS, M.D., San Francisco, Calif.

If ever the human race is raised to its highest practicable level intellectually, morally and physically the science of medicine will perform that service.—René Descartes. (16th Century.)

"IT is for medicine and dentistry to recognize a new day in social relationship and, rather than to be driven to new ideals of service, to accept leadership which should naturally flow to it because of the men who dominate its work and destiny. Rather I would see medicine and dentistry, which down through the centuries has been moved by outside forces and influences, assume a new leadership —not merely that of the laboratory or clinic, the bedside or hospital, but a leadership in thought, ideal and application in those fields that secondarily affect medicine and dentistry and by that leadership make medicine and dentistry the protagonist of a new and great era, rather than the maid servant of those who leading in other sociological fields, by secondary influence seek to shape the destiny of medical and dental practice.

"The Hippocratic Oath speaks of an ideal for the physician: 'I will look,' it says, 'upon him who shall have taught me this Art as one of my parents. I will share my substance with him and I will supply him necessities if he is in need— The régime I shall adopt shall be for the benefit of my patients according to my judgment and ability and not for their hurt and for any wrong.

"This is the dedication, the consecration of the physician, and I am sure of the dentist, to the ideals of their profession. But more is asked of them today. With these great sociological movements under way and even at fruition, it calls upon them not merely to complain, not merely to disagree, not merely to debate, but to find a fuller and freer and a greater place for medicine and dentistry, not only in the curing of human ills but in the

*Read at the Second General Meeting of the Seventy-Sixth Annual Session of the American Dental Association, St. Paul, Minn., Aug. 7, 1934.

great régime to make life better and happier and nobler—to bring to humankind some of the happiness on earth that the elect expect of heaven."

The foregoing is my premise and the spirit that I seek to impress on you. There is much evidence of turmoil in medical and dental economics. The path of the essayist or speaker who would attempt to find the real cause of medical and dental unrest is not an easy one. It is axiomatic that the solution of a problem must be preceded by a clear understanding of the nature of the problem.

In a relatively short space of time, the specter of insecurity has come closer and assumed concrete form to the average man. Three questions constitute the three modern plagues that drain his reservoir of courage and limit satisfactory existence. These almost constant questions are:

1. Am I going to have the opportunity to earn a livelihood?
2. Given the opportunity, will I be physically able to grasp it?
3. As a result of work performed over a period of years, will I be able to care for my needs in "old age"?

Medicine and dentistry are chiefly concerned with the second problem, but it is quite obvious that the three problems constitute an indivisible unit. Medicine and dentistry will eventually present an answer to their problem, but no solution can be fully effective without the answers to those remaining.

From the valley of poverty, three peaks stand out in receding sequence in the distant economic range: subsistence, comfort and wealth. Society may be pictured as a huge migratory stream of human beings, each endeavoring to attain his "promised land," some striving for subsistence, some for comfort, a few for wealth. In this striving is the source of the broad subject of industrial relations, a part of the broader subject of human relations. There is an inseparable relation between this picture and that of medical and dental care.

It is customary to think of the human being as one whose physical welfare depends on food, shelter, fuel and clothing. These are basic needs, and the ability and opportunity of the person to secure these items through his own efforts are the determining factors in his economic status. Ability and opportunity to secure these needs classify one as "self-supporting." Inability or lack of opportunity means poverty.

The position of medical and dental care in the scheme of living is anomalous. Even though it occurs as a basic need, its costs must be met after the other daily basic needs have been provided. It is for this reason that any fundamental consideration of the problems of medical and dental care must begin with an analysis of the economic status of the potential recipients of this service. While reasonably reliable statistics on the costs are available, the data on the ability of people to meet these costs after basic needs are provided have been difficult to secure.

In common with other states, Michigan was involved in the financial collapse of 1929. As time progressed, our hopes of early recovery grew dimmer and dimmer. By 1931, we gained a fixed realization that we were in a twilight zone between an era that was past and a new era whose dawn was still invisible. It was recognized that a new state of affairs would result, and, in any new scheme, the medical profession would be compelled to readjust itself. As to what those adjustments would consist of, what the relationship of physician and patient would be and what rôle, if any, government would assume in relation to health and the profession of medicine, we were not informed. We possessed no knowl-

edge of potential eventualities or what would constitute their nature. There were before us examples of movements with many ramifications. The honor, dignity and independence of the profession were involved. Whether the medical profession of Michigan would assume leadership and solve its own problems or would permit conditions to develop so that others outside the profession would solve our problems pressed for an answer. Would we sit idly by and permit an entering wedge to be driven in ere we awakened to full realization of the danger involved? Should we keep medicine and its economic practice abreast with the changes of society? Should we assume an offensive rather than a defensive position?

These questions induced serious consideration. At the annual meeting in September, 1931, our house of delegates directed the appointment of a committee to survey state medical services and health agencies for the purpose of securing factual data that would be helpful in the solution of arising problems. The committee worked for nearly two years, presenting its final report in July, 1933.

BRIEF REVIEW OF REPORT

It is impossible at this time to even begin to impart the vital factual data and related facts that were compiled. They constitute an exhibit of existent conditions that is most important to our endeavors to apply intelligent solution to Michigan's problems. They are, we believe, the first of their kind and are based on actual and not conjectural conditions. We are prepared to defend all the factual material (1) as being a true picture of present conditions and (2) as having been secured from actual field studies and investigations.

The report is divided into twelve chapters dealing with the following subjects:

1. The Evolution of Medical Care
2. Geographic Features of Michigan
3. Population Income and Costs of Living
4. Illness—Its Incidence and Cost
5. Physicians—Distribution and Practice
6. Physician's Income
7. The University Hospital
8. Hospitals
9. Public Health
10. Miscellaneous Reports
    - Free and Part Pay Clinics
    - Cancer Problem
    - Laboratories
    - Care of Negroes
    - Tuberculosis
    - Care of the Indigent
    - Industrial Relations
    - Medical Education and Licensure
11. Summary
12. Conclusions and Recommendations

PARTIAL SUMMARY OF FINDINGS

From our survey, we gained a large amount of specific information. This is imparted in the report by many tabulations, graphs and statistical deductions. It is impossible to weave them into any sort of pattern that will generalize them and reveal their merits or defects or their relationship to our state problems. They must be appraised and studied in connection with the entire report.

When we view medical and dental care as a whole, we are impressed with the tremendous expansion that is taking place in a limited circle that is more or less inelastic. It is control and direction of that expansion that summons our consideration and solutions.

Michigan has a population of nearly 4,500,000 persons who are potential recipients of medical care. This group composes 1,080,000 families and 76,000 persons not attached to families. As we studied these families, we found that they represented an average annual income of $648 per person and approximately $2,600 per family. That is the mass picture, and were it representative, our study

might well have ended when these facts were determined. Medical care is not being purchased on a mass basis; it was therefore necessary to analyze the mass. In that analysis is found the basis of many difficulties.

Thirty-five per cent of that public's total annual income was received by 8 per cent of the population. Our main interest, therefore, became centered in the 92 per cent of people whose annual income was in the balance—65 per cent of the total. In that analysis, it was revealed that the average income for the farm family was $1,335; while for the nonfarm family, it was $1,916. In the study of living costs, we found in one area that it ranged from $42 less than the family income to an excess in other areas of $443. Wherever income was found in excess of living costs, it was also shown that medical care must compete with insurance, transportation, education and inner urges that draw on the reserve that remains over actual living expenses, and medical care is always the weakest, least considered competitor.

When we considered medical services received and services required, a wide gap was demonstrated. The closing of this gap, which is our ultimate hope, involves many factors which impel further study of income, living expenses, medical care and costs. This is illustrative of one of our public factors.

We can make the general statement that our 4,725 physicians are so located as to make their professional services readily available to the population on a ratio of 1 to 888 persons. In some areas, there are centered larger numbers of doctors and in excess of local requirements. Now as we study these physicians, we uncover a modern tragedy in that they have much idle time which they are willing and anxious to use, even to the point that much is given away. Their idle time is a serious fact. On the opposite side of that picture is a public in need of more medical services, but now able to purchase only a limited amount of the physician's time. Involved in the picture is the finding that the public does not seek preventive care nor does the average physician report anything but a meager practice in the field of preventive medicine. This is true of immunization as well as of periodic physical examination. From 54 to 78 per cent of general practitioners in given areas reported less than ten physical examinations a year. We are alloting more study and thought to the physician's idle time.

Our study also concerned itself with the physician's income. I impart one or two outstanding findings in a very detailed compilation. The gross income averaged $6,590, but this figure shrinks to $3,876 after expenses are deducted. Most disturbing is the fact that 43 per cent, or approximately 2,000 physicians, have net incomes of $2,500 or less. Our checked and rechecked questionnaires, which imparted some startling views pertaining to income from medical practice, are graphically set forth in the report.

Clinics, hospitals, welfare agencies, funds, indigent care, cancer, tuberculosis, occupational diseases, industrial services and laboratories were all subject to survey and study and contributed informative guiding data which we feel will be of extreme value as we seek the formulation of policies and plans to correct untoward conditions.

This is the mass picture of factual conditions in Michigan. The report presented statistical evidence of the grinding and clashing of certain cogs that make up the social structure of the state. One cog is insufficient medical service; another is insufficient medical income, and still another, the placing of an unjust

burden on the profession which should be shared by the community.

The question may well be asked: What has been gained? Wherein has the work been justified?

1. We have gained a dependable insight of the nature of our problem.

2. We have fundamental facts related to existent conditions in our social structure, the public needs, professional interests and community and government health responsibilities.

3. We have dependable statistics.

4. A program of activity formulated itself as the findings demonstrated untoward conditions.

5. We have established lines of organizational endeavors and avenues of work.

These provide us with fundamentals on which we can erect our structure of applied medical economics. Without application, our problems would remain unsolved. It is lack of application that has retarded the medical and dental professions, prolonged public misconception and condoned the promulgation of objectionable plans and schemes arising within and without our ranks. We shall not only be able to record a stronger defensive attitude, but shall also be in a position to initiate an achieving offensive movement. It is now under way. We are hopeful of greater progress by reason of our clearer insight.

In July, 1933, Michigan's house of delegates discharged the "survey committee" and created a committee on medical economics. This new committee was instructed to study and prepare a plan or plans for the providing of adequate medical care for those who are listed in the lower earning bracket and to report back to the house of delegates. A specific stipulation was made that any plan proposed should incorporate these principles:

1. Free choice of the physician by the insured.

2. Limitation of benefits to those of medical services.

3. Control vested in the profession.

4. The exclusion of individuals or organizations that might engage in health insurance for profit (elimination of a third party).

The committee approached its work with the foregoing policies clearly in mind. The committee examined the available evidence concerning the operation, defects and merits of health insurance in other countries. We were unable to state positively that the principle and application of health insurance in foreign countries had failed or was satisfactory.

Satisfactory evidence was not available. To secure it, it was necessary to send investigators to England. Two members were sent abroad with instructions to secure first hand information on the following subjects:

1. Is the operation of health insurance unsatisfactory to either or both the profession and the public?

2. Has health insurance exerted a deteriorating effect on the quality of medical service?

3. Is health insurance constituting a grave financial drain on England and is the system itself in danger of financial collapse?

Negative answers were secured to the three questions investigated.

The committee investigated and studied the plans advanced in this country. In addition, an investigator was sent to observe systems proposed in several states and localities. Much time was spent with actuaries of our so-called "Big Ten" insurance companies. We sought factual data in many ways.

The committee reached a unanimous conclusion and recorded its opposition to the introduction of any of the present foreign systems in the United States.

The committee recognized the need of

a more equitable distribution of the burdens of sickness and a wider distribution of benefits of medical services.

Since the title of "health insurance" carries with it the implication of conformity to European plans, the committee selected the title of "mutual health services" in formulating its plan. The plan is a mutual one in the sense that three groups are vitally concerned: the public, industry, the profession, and its success is dependent on joint effort.

The following are the general provisions of Michigan's plan for mutual health services. To discuss details is impossible in the time at my disposal.

MUTUAL HEALTH SERVICES

1. Health services are to be provided at an agreed cost to lower income families.

2. These services include physician, specialist, dentist, nurse, drugs, hospital and surgical and optical appliances.

3. Administration is to be by

(a) A state board of governors, three doctors, one dentist, one pharmacist, one nurse and representatives of service recipients.

(*b*) A district board.

(*c*) A county board.

4. A change of doctor can be made on thirty-day notice.

5. Not more than 1,000 persons are to be allocated to one physician.

6. The cost is to be $27.88 per person per year.

7. Fees are to be for services to doctors and dentists.

8. Postgraduate study is provided for.

9. A reserve fund is to be set up.

The plan provides a temperate policy for the guidance of the profession. It is a policy that preserves the essence of American practice in giving primary consideration to the consumer of health services.

In many states, the profession finds itself in a difficult position. Lacking a constructive program, it is easy prey for commercial or political influences. Publicity given to the Michigan program may, therefore, exert a far-reaching effect in providing the profession in other states with the methods and materials for combating destructive influences. Against these influences nothing is more effective than the sure weapon of constructive action.

The effect of "mutual health service" on public health activities is fairly obvious. In brief, it means an expansion of the services of preventive medicine and dentistry by private practitioners and a concentration of public health work on educational activities. The committee feels that such concentration will be heartily approved by the public health agencies concerned.

MOVEMENTS NOW UNDER WAY

Thought should be given to the probable development of movements in the United States toward some form of compulsion with respect to the purchase or distribution of health services. There is little doubt that the movement has gained momentum and that the coming legislative sessions in many states will see bills presented. I mention only a few of the developments now being advanced in the United States.

Many county medical societies have undertaken projects in health insurance with little study and with almost no central or state authority. Their action has been inspired by the profession's and the public's demand "to do something." Such disorganized, leaderless action is regrettable. It may lead to pernicious precedents difficult to erase when a general policy is finally agreed on. Such action may also tend to develop commercial competition between groups of physicians. This situation is particularly acute in some western states.

Hospital insurance is being developed in more than twenty states. There is nothing particularly wrong in the principle of hospital insurance, but it can expand only in one direction and that is to include medical and dental services. That demand has already arisen from the hospital insured public. If the movement extends, professional control will be relinquished to lay supervision and direction.

The Milbank Foundation is advancing a plan for state controlled compulsory health insurance for persons in the $3,000 or under income group. It is reported that this foundation purposes to make the adoption of compulsory health insurance one of its major activities. Its agents are now presenting these plans before officials and organized groups.

There is existent an aggressive drive toward unemployment insurance. It is already in operation in Wisconsin. If unemployment insurance becomes both widespread and inclusive, it may be confidently expected that a short time will elapse ere it is made to include medical and dental care for the unemployed and the treatment or correction of physical defects that cause unemployment. One needs but to recall what amendments were made to workmen's compensation laws and to the program of Federal Emergency Relief. Need I direct your attention to the arbitrary medical and dental regulations in the FERA and the CWA?

In the Federal recovery program, so-called, proponents for bizarre welfare movements besieged government offices, seeking to cause inclusion of their plans in federal regulations that were promulgated. At one of the many conferences, the following statement is accredited to Mr. Harry L. Hopkins, Federal relief administrator:

> You aren't going to get health insurance if you expect people to do it voluntarily. I am convinced that by one bold stroke we could carry the American people along not only for health insurance but also for unemployment insurance. I think it could be done in the next eighteen months.

The California legislature has created a commission to study health insurance and to present a plan and recommendation at the 1935 session. Past experiences warrant the prediction that similar bills will be introduced in many states this coming winter.

In Brooklyn, there exists the Medical League for Socialized Medicine, with a membership of more than 500 physicians unequivocally committed to salaried physicians providing service under the state.

June 8, of this year, according to press reports, President Roosevelt announced that this fall he proposed to present certain plans to provide for old age pensions, unemployment insurance and medical care for certain classes of people.

As one casts about, he will find in this country a startling number, an increasing number, of exhibits and movements that reflect rapidly developing proposals for some form of health insurance with control vested in lay or governmental agencies.

WHAT COURSE SHALL WE PURSUE?

An ancient problem in mechanophysics has been ventilated anew. It is a problem which goes back in all likelihood to Archimedes. Given a frictionless pulley over which passes a weightless rope with a 10-pound monkey on one end evenly balanced with a 10-pound weight on the other: Should the monkey climb the rope, what will happen to the 10-pound weight? Will it remain stationary or will it go up or down as the monkey ascends? It is a matter on which eminent scientists appear to disagree. The problems presented by our economic situation are as difficult of solution. Are we

to go up or down? We are being pressed for an answer.

For a score of years, we who have been intimately associated with organizational activities have imparted facts concerned with the trends of medicine and medical practice. Through these years, many addresses have been delivered and many articles published in our journal. A majority of doctors, secure and snug in their prosperous days of practice, rarely paused for reflection, and, equally indifferent, pursued independent courses and gave little or no heed to their professional future or to the untoward forces that were steadily encroaching on the field of medicine and dentistry.

Then overnight, "state medicine" became a watchword, created some concern and aroused a few. Came prosperous inflated days and then the "crash." Economics became the new watchword and is the theme song of the day.

Our pressing need is to recognize that governments exist to be supported by the people and not to support the people. Our perniciously acquired habit of endeavoring to "thumb" all we can from the government is fundamentally unsound. The same principle applies to organized effort.

It is not necessary for me to review existent conditions in community life, nor to enumerate the alleged remedial measures that governments and agencies are seeking to administer. My concern, and I trust your concern, is how the profession will conduct itself to surmount and satisfactorily solve these problems and prevent the monkey from crashing the weight. We are at a crossroad. Where shall we go and under what conditions?

At the crossroad, we perceive signboards imparting directions for guidance. In deciding on the road which we are to travel, it is well that we pause to read them and reflect on their portent. These signs read:

Sign 1.—By the term "contract practice" as applied to medicine is meant the carrying out of an agreement between a physician or a group of physicians and a corporation, organization or individual, to furnish partial or full medical services to a group or class. Contract practice *per se* is not unethical. Certain features or conditions, if present, make a contract unethical, among which are (1) solicitation of patients directly or indirectly; (2) underbidding to secure the contract; (3) compensation inadequate to assure good medical service; (4) interference with reasonable competition in a community; (5) prevention of free choice of a physician; (6) conditions of employment making it impossible to render adequate service; (7) the fact that the contract is contrary to sound public policy.

Sign 2.—The conservation and maintenance of the public health is a primary function of our government. (Bull. No. 7.)

Sign 3.—Medicine and its several special branches are but a part of our cultural and commercial structure. Medicine cannot be criticized or analyzed as an unrelated entity.

Sign 4.—Whenever the control of the practice of medicine has been wrested from the medical profession, it is found that either the public or the profession or both are dissatisfied with the result. Conversely, it is found that in those countries where the medical profession retains control of the practice of medicine, both the public and the profession are satisfied.

Sign 5.—The medical care of the indigent is not the sole responsibility of the medical profession. It is a community responsibility in which the profession shall assume a reasonable and partial degree of responsibility. In the past, the medical profession has carried the major

portion of that responsibility through its generosity and, to an unjust degree, by reason of laws that have been enacted and the attitude of civic and state officials.

Amid these signs and others, there has been placed in outstanding letters this most important caution sign: "Go Slowly—Men Working Ahead." The medical and dental professions and *not* commercial conjurers or political agitators must select the correct course, and this selection will be made in the interests of the public no less than for the continued freedom, independence and self-respect of medicine and dentistry themselves.

Whether our professions will continue to meet their responsibilities and duplicate their successes of the past in safeguarding scientific medicine and dentistry, preserving the standards of medical and dental practices and promoting the best interests of the individual physician and dentist depends on the other factors in successful organization, namely: "The active, united and enthusiastic interest of every member."

We must deal collectively with the exploitation of medicine and dentistry. The safety of the public in matters of life and health rests upon the initiative of our professions. The preservation of all that is best in our professions, of all that has been produced in the development of the science of medicine and dentistry, can be accomplished only in a closed union of our individual interests.

Medical and dental organizations have been and will continue to be the most powerful influences in the protection and maintenance of the personal interests of individual physicians and dentists. The fact should not be lost sight of that medical and dental organizations have consistently demanded that the economic security of the individual practitioner be insured along with the welfare of the public at large in any new form of medical and dental practice which may be evolved. Medical and dental organizations have not overlooked the fact that the personal, human element in medicine and dentistry predominates.

"After all, medical and dental practices are secondary to, and dependent upon, the individual progress of the medical and dental professions. Let the professions fail and medical and dental practices fail also. Medical and dental practices do not stand alone and for that reason cannot endure unmolested without the protection of the members of these professions. Medical and dental practices are merely the children of the medical and dental professions and without proper organization become orphans."

At the Cleveland, 1934, annual meeting of the American Medical Association, the house of delegates devoted two sessions to considering our medical economic problems. A policy was established by the formulation of ten principles that shall be observed in the formulation of any plan or proposal for providing medical care for any group of individuals. These principles are:

1. All features of medical service in any method of medical practice should be under the control of the medical profession. No other body or individual is legally or educationally equipped to exercise such control.

2. No third party must be permitted to come between the patient and his physician in any medical relation. All responsibility for the character of medical service must be borne by the profession.

3. Patients must have absolute freedom to choose a duly qualified doctor of medicine who will serve them from among all those qualified to practice and who are willing to give service.

4. The method of giving the service must retain a permanent confidential relation between the patient and a "family physician."

This relation must be the fundamental and dominating feature of any system.

5. All medical phases of all institutions involved in the medical service should be under professional control, it being understood that hospital service and medical service should be considered separately. These institutions are but expansions of the equipment of the physician. He is the only one whom the laws of all nations recognize as competent to use them in the delivery of service. The medical profession alone can determine the adequacy and character of such institutions. Their value depends on their operation according to medical standards.

6. However the cost of medical service may be distributed, the immediate cost should be borne by the patient if able to pay at the time the service is rendered.

7. Medical service must have no connection with any cash benefits.

8. Any form of medical service should include within its scope all qualified physicians of the locality covered by its operation who wish to give service under the conditions established.

9. Systems for the relief of low income classes should be limited strictly to those below the "comfort level" standard of incomes.

10. There should be no restrictions on treatment or prescribing not formulated and enforced by the organized medical profession.

If it is determined in a community that some experiment to change or improve the method of administering medical service is desirable, observance of these principles will remove many of the "disturbing influences" from such an experiment. In all such experiments, attention must be sharply focused on the quality of medical service.

Such restrictions will undoubtedly lower the enthusiasm of many of the present advocates of such schemes. They remove the interest of the politician, the commercial promoter and all those who consciously or unconsciously are seeking to achieve other objectives than better medical care for those unable to provide such care for themselves under present conditions. All these principles are directed toward protecting the character of the service to be given and all are directly designed to guard against abuses which experience shows are bound to arise when these principles are neglected. In most communities, it will be found that comparatively few changes in the methods of administering medical care will be necessary. That type of medical practice which preserves the personal relationships between physician and patient, that maintains the practice of medicine as a profession and that has withstood the test of centuries must be preserved for the best interests of both the public and the medical profession.

American dentistry will do well to formulate a similar pronouncement for the guidance of its members. By united action we can preserve those proven principles which we know to be the best for the public and our own members.

APPLIED ECONOMICS

There are several general principles requiring observation ere achieving principles of application can be promoted to successful conclusion. Foremost is the development of a cooperative sustaining attitude of contribution of service on the part of every member. They must be educated to realize that the first great requisite is the subscribing of self and personal service to the activities of the county and state societies. Dividends will accrue in direct ratio to the contribution that members make. Service on committees, service in observing principles and policies, service in securing the requisite public support. As you give, so will you benefit. A universal abandonment of the attitude of "what do I get" for one of "what can I give in order that I may

get," this must be the first readjustment and enlistment.

Following that comes loyalty to your county society exhibited by an intense, sustained interest in its meetings and an effort to institute and develop a county or local program for the advancement of the recommendations made by your delegates as they relate to practice, indigent care, preventive medicine and public health. Universal support, without exceptions, must come from every member, and every doctor and dentist should be a member.

The third essential is individual proficiency and ability. Adherence to modern principles and methods of practice through planned study and clinical work carried out during a portion of each year must be a standard to be met by every doctor and dentist.

When we, as a profession, continuously maintain a standard of proficiency and render proficient service, our continued independence will be insured and our economic problems solved in great part. For the individual physician and dentist, that is the first principle in applied medical and dental economics.

My concern lies in the physician and dentist of today and their followers of tomorrow—concern as to how they are going to measure up to the new state of affairs that is to be, how they are going to acquit themselves of their new responsibilities and what ideals they will establish to govern and inspire them. More exacting qualifications for the physician and dentist are apparently requisite to conserve their present condition, acquire renewed public confidence and establish a leadership in our nation in all matters pertaining to the health and physical welfare of the people. Therein lies our future economic stability, the future of medical and dental science, practices, hopes and aims. While wearing the mantle of science, we cannot worship in the temple of gold. Our ideal cannot be cast aside and, in its stead, the money pots of Midas become the emblem of our professions.

With the acceptance of the principles of loyalty through membership and individual proficiency and their continuous observance, we shall stand before the public in a commanding position that will enable us to institute procedures that will bring about satisfactory adjustment.

Can there be any question as to the road that we shall travel?

Look again and you will see the sign and arrow: To scientific medicine and dentistry, under the sponsorship and leadership of organized units that have maintained through the centuries traditions that have ever been mindful of the best health interests of all peoples.

RECOMMENDATIONS

Our passage along this highway will not be satisfactorily accomplished without leadership and public education.

To paraphrase Salter, we must take the system we know, suggesting how it may be strengthened where it is weak, repaired where it has crumbled and rebuilt where new needs require additions to its fabric. It is our own system in which we have grown up in that we must reform—and in part transform. We must gather up the dragging reins of medical and dental economics and take our place in the driver's seat.

It should be obvious that advantage in controlling legislation will lie with the first constructive program presented and supported by our united professions. If in addition to being first, our program has a record of successful demonstration, that advantage will become great enough to direct legislative action. Only in this manner can we hope to combat successfully commercialism, profit and political motives.

Formulation of a plan or program does not imply its immediate introduction and application. I look on it as a reserve defense. If society or government eventually demands some such provision or proposes legislation to institute this form of medical and dental service, the professions should be prepared with a plan that is of their own making, controlled and directed by the profession.

It is not proposed to inaugurate the plan for "mutual health services" in Michigan at this time. It may never be instituted. It is felt that we are prepared. If legislators attempt to make these provisions, we shall be in a position to guide and direct.

Propagandists and some of the public have charged that we are unwilling to apply experimental methods to solutions. If we agree on a plan, and inaugurate it under control, such procedure refutes the charge and formulates an unanswerable reply.

DENTAL PRACTICE IN ENGLAND

Our commission to England made inquiry as to the status of dentists in the English health insurance program. I submit the report as an appendix to this discussion.

In all foreign plans of health insurance, the dental profession has received but meager consideration. Very unsatisfactory provisions have been made for the utilization of the services of your profession and, as a result, dentists are in an unenviable position.

In all proposals that are being advanced in this country, the same lack of consideration, except in the Michigan plan, is accorded to the dental profession.

I am disinclined to advance the reasons therefor. The answer must be sought by your organization.

I do desire to urge, and earnestly so, that every member of your association and of your profession become awakened to the fact that some form of medical and dental care, either voluntary or compulsory, is before you. Whether you like it or not is of no moment. The pressing question and need is to cease complaining, disagreeing and debating that phase of the question. The proposals confront your profession. What do you propose to do, what representation will you make to conserve your interests and to maintain your independence? The answer rests with the pronouncements and policies that your association enacts. The history of compulsory health insurance is a history of disastrous results to the professions because of lack of unity. It is a history of an organized group dealing with a disorganized group of professional units or individuals. Profit by the experiences of the professions in foreign countries. Had they been first in the field with a plan, there would have been saved much bitter feeling within the profession and less loss of public prestige.

You must fully realize that by a united exhibition of willingness to act courageously and effectively, you will reveal a discipline, a resourcefulness, a fertility of invention, a capacity to develop leadership and to respond to it that will enable you to stand before all the world and avow your confidence in your own strength, your own purposes and your own way of life and your own way of rendering professional services.

In England, as well as in the United States, one may secure evidence to support either good or bad practices or policies. The arguments could go on endlessly but to no avail. That attitude creates one of your gravest dangers and offsets desired results. I bid you to banish any and all strife that may exist between certain groups who demand or insist that their views be accepted in arriving at a solution as to dentistry's policy.

You must arrive at a common understanding, for your interests are mutual. It must also be realized by each group that phases of the problem vary in sections of our country. Ere insistent demand is made by any group for the acceptance of its judgment, that group must make certain that they have complete knowledge of these peculiar sectional problems and have accorded consideration to them when advancing proposals and demanding their adoption. The Michigan Plan will require certain flexible features to meet the needs of our mining, rural, industrial and metropolitan areas. The same flexibility will be required in any national proposal.

There is one thing that is stronger than armies, and that is an idea whose time has come. The idea of the necessity for some provision that will provide adequate medical and dental care for the lower income bracketed groups is here. Shall we not embrace it and assume the leadership that will place us in an almost impregnable position with a militant supporting force? To the timid and hesitating, everything is impossible because it seems so. We dare not be timid.

If the plan of action agreed on is sound, nothing can stop it or wrest control from our hands. If it is wrong, it will stop itself. At the end of our experimentation in selected and controlled areas, the hope is that we will know and, through our knowledge, American medicine and dentistry also will know and be directed.

The second, if not the first, essential is a united profession sustaining an acceptable dynamic leadership. At present, medicine includes in its organizational ranks approximately 75 per cent of eligible members. In this percentage, there are about 30 per cent of the membership who are members in name only and who pursue independent courses, often in total disregard of adopted policies and principles. I understand that in the American Dental Association an even less satisfactory condition exists.

A demand confronts us to engage in a joint intensive campaign of mobilization and education. Action to that end should be taken immediately to insure united effort. It will be necessary to appoint officials, to command and direct the recruiting forces. To possess vitality, the doctor must be organically united to the general body of his profession. The local county or district society is the monad of medical and dental organization, the creative unit of guild existence and guild energy. We shall not lead or command until solidarity is evidenced.

Our quest is for intelligent leadership, aiming at a healthier and more secure social order. Our work must go on until society is relieved of the misery of preventable ill health and until there arises an understanding between our professions and the public that will result in greater mutual respect and security with the physician and dentist secure in a sound, safe and independent community status.

American medicine and dentistry will assume that leadership and will become the protagonist of this new era. American medicine and dentistry will successfully resist the advances of those who lead in other sociologic fields and who now seek to shape and influence conditions of practice. Public confidence may be placed in the American Medical and Dental associations and their constituent state units to formulate and apply a sound, safe, dependable program of American medical and dental practice, a program that will safeguard the American public and at the same time maintain a high standard of medical and dental service and a continuation of the scien-

tific investigations and developments that have been recorded the past fifty years. By choice, we must seek to lead. Mercifully we shall accomplish euthanasia for the monkey. The weight must not, shall not crash.

CAST ATTACHMENTS FOR BRIDGEWORK, WITH SPECIAL REFERENCE TO VITAL TEETH*

By O. G. KRAUSE, D.D.S., Milwaukee, Wis.

THE privilege of practicing dentistry thirty years or more has afforded me an opportunity of observing what I believe has been the most interesting and scientific period in the history of our profession.

It was within this period that we have seen the development of the "x rays" and the "casting process," each one of such outstanding achievement that nowhere in the history of dentistry is there any other to compare with it, with the possible exception of local and general anesthesia, which were discovered many years previously.

I mention these developments particularly because they constitute such an important part in the advancement of bridgework.

HISTORY

Before the advent of the casting process, attachments for bridgework were few and limited. The full banded or gold crown had been in use about thirty years, being followed by the Richmond crown or attachment (used on pulpless teeth); the open face crown or attachment and, last, the Carmichael attachment and the staple, these last two named similar in construction.

The Carmichael attachment was a patented attachment (in fact, all were at one time), but a test in court determined that the profession could not be prevented from using it. It had been proved that a dentist in Virginia had demonstrated the same attachment in 1882, and that ended the litigation.

These types of attachments were in use on my entrance into the practice of dentistry.

Since the various crowns and attachments were all made of wrought metals and solder, it can readily be seen that the methods of fabrication placed a severe handicap on the operator, the natural result in the hands of the majority being poor and indifferent bridgework.

Notwithstanding the many handicaps, clinical evidence even at this time is a tribute to those that possessed extraordinary skill and resourcefulness. Focal infection was little understood and often disregarded, and a good deal of criticism that was directed at fixed bridgework at that time could be ascribed largely to improper diagnosis, or, more likely, none at all.

Since the advent of the roentgen rays has made it possible not only to discover traces of infection, but also to determine

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 11, 1933.

the size of the root imbedded in the bony process and the amount of bony covering, the position of the root and the size and location of the dental pulp, affording a guide for operative procedure.

A few years before the introduction of the casting process, the partial crown or attachment, often referred to as the Carmichael, was receiving considerable attention from many earnest crown and bridge workers. Its chief advantage over the old open face attachment was the elimination of any display of gold. As I remember, in this type of attachment of thirty years ago attention to detail such as is seen in our modern preparations was not in evidence. The main objective was a minimal gold display and maximal mechanical retention. The following description is virtually correct. As this preparation was to cover the proximal and lingual sides of the tooth, sufficient tooth structure was removed to provide for the artificial substitute, that all convexity of those surfaces might be eliminated, leaving no undercuts. Then proximal grooves "parallel with the long axis of the tooth" were cut with a fissure bur and connected lingually with a similar groove.

Fig. 1.—Original Tinker three-quarter anterior preparation in step form.

The many failures of this attachment were, as the generation before were all well aware, due largely to the inability to make a snug fitting attachment with the technics available at that time, and no one dreamed that, in a few short years, there would be given to the profession a method that would eliminate this deficiency, which was to be known as the casting process.

THE CASTING PROCESS

It is not the intention of this paper to name the originator of the casting process, as there have been many controversies over the subject. I know that, in January, 1907, William H. Taggart, of Chicago, gave a demonstration of casting an inlay, in New York City. The news was heralded like a flash throughout the dental world, and we can properly designate this as the beginning of the casting era.

While the casting process was primarily for the inlay, it soon became apparent that its uses were not limited to the inlay, but that crown and bridgework offered a much greater field. It has practically revolutionized the methods of fabrication, some even asserting that a complete bridge can be cast and made to fit all in one operation.

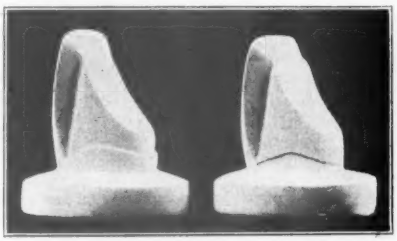

Fig. 2.—Proximal grooves.

In the field of removable restorations, with the addition of elastic gold, there has been given to the profession the finest and most efficient type of removable work ever known to dentistry.

Splendid results are now obtainable with the casting process, but it took many years of painstaking research work by many members of the dental profession to

obtain the perfection demanded for our delicate dental operations.

THE CAST INLAY

It was not long after the profession began the use of the cast inlay that it became aware of an inherent weakness in that it did not fit, which was due to shrinkage of the gold. This was the weakness manifested in the old solder inlay. The situation did not discourage the profession. Inlays made at that time were manipulated; margins were burnished and the inlay cemented to place with the fond hope that it would give good service, and, remarkable as it may seem, many of them are still giving good service.

With the newer knowledge now available, it is possible to make an almost perfect casting. This has been accomplished by what is known as wax expansion. Investment setting expansion or thermal expansion technics are methods leading to one end result, namely, an enlarged mold sufficient to compensate for the shrinkage of gold.

Fig. 3.—Upper bicuspid four-fifths preparation, commonly called three-quarter in step form; showing choice of three end-results.

Fig. 4.—Upper molar four-fifths, commonly called three quarter preparation, in step form; showing three end-results.

INLAYS—AS BRIDGE ATTACHMENTS

It soon became apparent, when various forms of inlay preparations were developed, that many of these anchorages possessed sufficient strength as bridge attachments, and they have given useful and satisfactory service for many years. However, the successful cases were the exceptions. Many such attachments did not have sufficient anchorage and soon became loose, and many teeth were fractured because of an inherent weakness in the principles involved, namely, cutting so deep to obtain additional anchorage that fracture of the tooth was the inevitable result. Pin anchorages in many forms were added to insure retention, with the possibility of less tooth destruction and better anchorage. This was an improvement, but did not completely solve the problem. Another method to prevent the dislodgment was to make a loose joint, often called the stress-breaker. Many use this method quite successfully, particularly on two surface inlays. It is also used when parallelism cannot be obtained. Some have used it because of the theory that teeth move in function and that individual movement of the teeth should not be interfered with.

The three surface inlay known as the mesioclusodistal, while possessing added mechanical retention, has the disadvantage of excessive tooth destruction, which I shall mention later in this paper. The mesio-incisodistal inlay is, on anterior teeth, quite satisfactory in favorable cases.

Drs. Irving and Gillette have presented an elaborate system of inlay preparations, with many good suggestions. However, I find no engineering or mechanical features but what have been known to many inlay and bridge workers. All in all, if inlays are to be used as bridge attachments, a careful study of all

criticism has been directed at this preparapossible forms of preparations should be made, and extreme care should be exercised in the selection of favorable cases, not only of the individual tooth and the size of the restoration to be made, but also on the basis of the type of occlusion encountered in the individual case.

THE MACBOYLE ATTACHMENT

The MacBoyle attachment, known as the inlay-onlay, used exclusively on bicuspids and molars, is unique in being an inlay and an onlay at the same time. The objective of this attachment was minimal tooth destruction and simplicity of preparation, a very desirable feature. The only criticism that I can see of this attachment is the feature which, while adding strength and stability, permits too great a display of gold on the buccal surface.

Fig. 5.—Lower molar, mesioclusodistal veneer, in step form. (Author's conception.)

Before I attempt to describe all the various types of attachments that have been developed up to this time, permit me to present my conception of what the requirements of a partial attachment and of a three-quarter crown attachment should be. After a careful analysis, they can, I think, be summed up in the following order: (1) minimal tooth destruction, (2) maximal mechanical retention, (3) minimal display of gold and (4) conformation to the theory of extension for prevention.

EVOLUTION OF THE PARTIAL CROWN OR ATTACHMENT (CARMICHAEL)

As soon as the profession discovered that the casting process could be used on all types of bridgework, it was soon applied to the Carmichael crown and attachment, the original preparation being employed with more or less unsatisfactory results. The shrinkage of gold was so great that crown and attachment would not fit the preparation, extensive grinding and manipulation being necessary to make them go to place.

During this period E. T. Tinker, of Minneapolis, presented to the profession his conception of partial preparations applicable to every tooth in the mouth, which soon were known as the three-quarter crown and attachments.

His preparation of anterior teeth differed considerably from the Carmichael

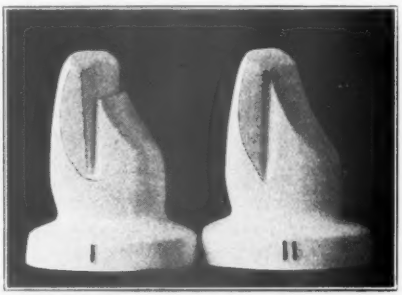

Fig. 6.—*I*, original Carmichael preparation, with concave groove proximally and lingually. *II*, modified preparation, using v-groove.

in that the groove used for retention is v-shaped and runs parallel to the incisal one third of the tooth, insuring greater length and anchorage and conforming to the theory of extension for prevention; while the Carmichael attachment used a concave groove and was placed parallel to the long axis of the tooth.

I have always regarded the Tinker three-quarter anterior preparation the most elaborate I have ever seen in dentistry, and the most difficult; yet, when correctly carried out representing the work of an engineer and artist. Much

tion as that too much tooth structure had been cut away; the v-groove was placed too far labially, and in the finished preparation, the enamel was so thin that the gold could be seen through it; also, many pulps died because of excessive deep cutting in the placing of the v-groove.

I believe that some of this criticism is justified and also that some of this so-called extensive tooth cutting was nothing more than careless operating in many cases. The preparation is so exacting, and, if it is not properly understood, the tooth can easily be ruined.

It seemed that the most difficult part of the procedure was the making of the

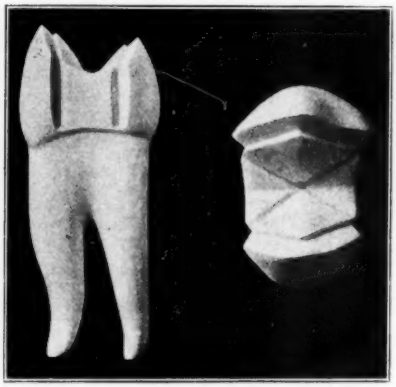

Fig. 7.—Mesioclusodistal veneer, upper bicuspid (two views), proximal and occlusal. The occlusal grooves in all preparations are optional. (Author's conception.)

proximal grooves, having them in correct position and parallel to each other. The latter is very important not only from a mechanical point of view, but also from a physiologic point of view, the pulp being threatened by encroachment of the preparation. Dr. Tinker taught and demonstrated all these points years ago. He also made up a set of plaster casts showing the anterior preparation in step form.

These step form models have been the basis of my attempt to standardize all crown and bridge work preparations, in step form and step-form instrumentation, regarding which I shall go into detail later.

I have used the Tinker three-quarter crown or attachment for many years. For a long time, I thought that possibly I was cutting away too much tooth structure, but I soon discovered that the possible reason for this was a poor method of instrumentation and the lack of an instrument to make the v-groove properly. An instrument of this kind designed by me has been in use several years.

The feature of v-instruments is that the cutting surface presents approximately a 90 degree angle. The use of

Fig. 8.—Lower molar; comparison of several types of mesioclusodistal and four-fifths attachments.

these instruments renders it possible to make a perfect v-groove, avoiding the possibility of undermining the enamel by the use of chisels and burs. The v-groove in the Tinker three-quarter crown preparation, when correctly made, has a 90 degree angle, measured from the labial surface. The v-file is particularly recommended because of its slow cutting possibilities, with a degree of accuracy far greater than that of any instrument which I have ever used for this purpose.

MODIFICATION OF THE TINKER PREPARATION BY DOXTATER

While similar in preparation and results, Doxtater's modification of the Tinker crown and attachment seemed to

purpose less tooth destruction and avoidance of any display of gold. This was accomplished by placing the groove slightly linguad from that in the Tinker type and thus avoiding removal of the contact point.

PIN ANCHORAGE AS USED IN PARTIAL ATTACHMENTS

Substitution of the pin anchorages for the proximal groove type has been practiced many years. The main objective of their use was a minimal amount of tooth destruction. While in favorable cases they prove efficient, their use should be largely restricted to small bridges, where stress might be negligible, and as splints.

The great danger in all types of pin anchorages is that pulp exposure may occur if the pins are not properly located.

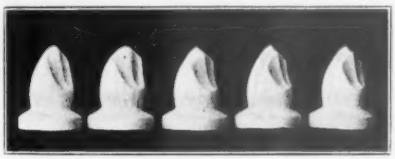

Fig. 9.—Upper cuspid; three-quarter preparation in step form.

THE PINLEDGE ATTACHMENT

The pinledge attachment, designed, developed and recommended by James K. Burgess, while a distinct improvement over the first attempts at using the pin anchorage principle has the same disadvantage, the possibility of pulp exposure.

The main feature of the Burgess preparation is two transverse ledges on the lingual surface, one incisal and the other near the gingivae. These ledges serve as the base where the pins are to be placed. Use of these ledges seems to take the main strain off the pins and transfer it to the ledge. These preparations are no doubt an improvement over previous types of pin anchorages. The Burgess preparation and technic are very thorough and an excellent asset to our various preparations.

SLICE PREPARATIONS

The term "slice" as applied to partial attachments was, I believe, first used by Karl W. Knapp. The principle was not a new one, as it was used in the original Carmichael attachment.

The Carmichael lateral grooves, mesial and distal, were placed parallel to the long axis of the tooth, midway between the labial and lingual surfaces, and a labial extension was cut to provide for additional tooth coverage, in an attempt to conform to the theory of extension for prevention. Apparently, those who advocate the slice preparation ignore the theory of extension for prevention in order to conserve tooth structure.

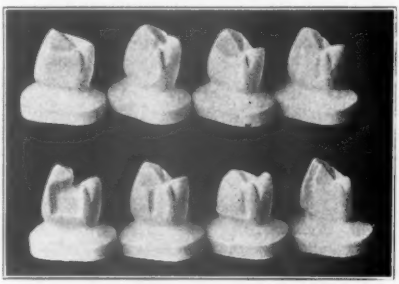

Fig. 10.—Lower first bicuspid. Above: Mesioclusodistal veneer in step form. Below: Left to right: Mesioclusodistal inlay; slice; three-quarter using buccal surface; three-quarter using lingual surface.

I believe that the slice preparation has its best application on the anterior teeth and many various forms of its application have been used successfully. Drs. Irving and Gillette have presented the slice preparations applicable to the bicuspid and molars in a thorough and capable manner. I do not use this form for bridge attachments.

The preparations and attachments so

far mentioned in this paper constitute approximately all the types in vogue at the present time. I believe each one has merit and conforms very well to the requirements suggested earlier in this paper. These preparations can be used on all anterior teeth, both upper and lower.

PARTIAL ATTACHMENTS ON BICUSPIDS AND MOLARS

The three-quarter crown or attachment on anterior teeth has been correctly named as it covers approximately three quarters of the tooth. In the posterior region, the anatomic form is so arranged that we have five distinct surfaces, and I believe that attachments for these teeth

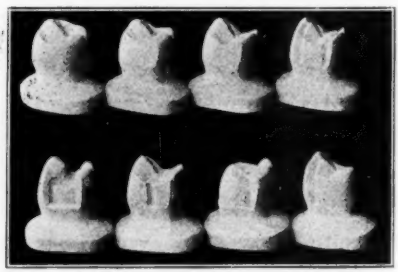

Fig. 11.—Lower second bicuspid. Above, mesioclusodistal veneer in step form. Below, left to right, mesioclusodistal inlay, slice, three-quarter using buccal surface and three-quarter using lingual surface.

would be correctly termed if named according to the number of surfaces they cover. For example, an attachment that covers the mesial, distal, lingual and occlusal surfaces covers four-fifths of these teeth, and should be so called.

This four-fifths attachment has been in use for many years. Carmichael used it before the advent of the casting process. Since then, many modifications of this preparation have been used. Tinker first used it as a modified mesioclusodistal inlay, adding part of the lingual surface and leaving all margins accessible to brush line. Then the complete lingual surface was used, with a slight shoulder or finishing margin at the gingivae. In fact, all Tinker preparations, whether on anterior or on posterior teeth, used this shoulder or finishing edge.

While I believe that the shoulder or finishing edge is ideal, and correct in principle, thus making a flush joint with the periphery of the tooth, its use is limited to a few cases because of the delicacy of its preparation, plus the shortcomings of the casting process.

I prefer the shoulderless preparations on all crown and bridge attachments, including the full metal crown; first, because of simplicity of preparation and wider range and adaptability, and, second, because clinical evidence has proved

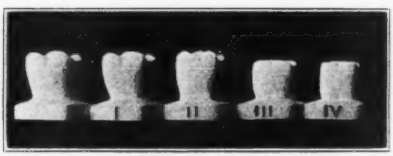

Fig. 12.—Full gold crown in step form.

that the shoulderless principle can and has been used successfully.

In many cases, in the posterior region, it is an almost physical impossibility to prepare a shoulder.

LOCATION OF VERTICAL GROOVE

This groove, I believe, should be placed parallel and close to the buccal surface in order to bring the margins to the brush line and give added strength and a correct finishing margin, and, if carried out correctly, it will cover that part of the tooth where decay is liable to occur, thus conforming to the theory of extension for prevention.

The placing of the groove near the labial—and the fact of its close proximity to the pulp—have prompted certain op-

erators to place this groove or box near the center of the tooth, using what is known as the slice preparation and ignoring entirely the theory of extension for prevention.

This preparation when carried out to its completion covers the proximal, lingual and occlusal surfaces, including the buccal cusp, so that approximately a millimeter of gold can cover it for protection.

This preparation can be carried out on practically all bicuspid and molar teeth, including the lower bicuspids and molars, with the exception of those that have constricted necks and extreme convexity lingually.

For those exceptional teeth, Tinker recommended reversing the procedure and used the labial surface instead of the lingual to avoid the possibility of cutting too close to the pulp. The contour of certain of these teeth make it almost impossible to prepare them for a full metal crown.

MESIOCLUSODISTAL VENEER: AN ORIGINAL CONCEPTION

After a careful examination of all forms of attachments designed for bicuspids and molars, and after further study of their anatomic forms, it occurred to me that even with those carefully designed attachments now in use, sufficient anchorage could be obtained by redesigning, whereby less tooth would be sacrificed by using the mesioclusodistal veneer principle instead of the orthodox box mesioclusodistal.

Earlier in this paper, I made reference to the fact that this preparation sacrificed too much structure. I have used this veneer preparation for the past two years and am satisfied it has all the mechanical requirements necessary for retention, with minimal tooth destruction and minimal display of gold. It conforms to the theory of extension for prevention, practically eliminating any possibility of fracture, because of the double groove, and I submit it for your consideration. For want of a better name, I call it the mesioclusodistal veneer.

In this preparation, the proximal sides are removed with a suitable disk and a sufficient amount of occlusal surface is removed to permit employment of a suitable thickness of gold following occlusal anatomic form approximating about 1 mm. at the crest of the buccal and lingual cusps and about 2 to 2.5 mm. in the grooves and sulci.

Then two v-grooves are placed mesially and two distally at the buccal and lingual aspect, for added mechanical strength and frictional resistance.

Placing these grooves in this position makes it possible to conform to the theory of extension for prevention.

These grooves may be extended occlusally from mesial to distal aspect, along the crest of the cusps, if added strength is desired in the finished attachment. The gingival margin of these attachments are of the shoulderless type as the v-grooves are not carried quite to that point.

SYSTEMATIZED STEP FORM PREPARATIONS FOR CAST ATTACHMENTS, INCLUDING THE ALL METAL CROWN

You will all agree that methods of preparation, whether for the full or partial crown, have been largely empiric, that practically no two operators used the same procedure and that if a systematized method were used, these preparations could be improved and simplified.

STEP FORM PREPARATIONS FOR ALL BRIDGE ATTACHMENTS

Step I, Mesiodistal slice for all preparations, including full gold crown.

Step II, Anterior three-quarters lingual and incisal. Posterior three-quarters, lingual and occlusal. Mesioclusodistal veneer, occlusal. Full gold crown, buccal and lingual.

Step III, Anterior three-quarters, making of grooves. Posterior three-quarters, making of grooves. Mesioclusodistal veneer, making of grooves. Full gold crown, occlusal.

Step IV, Elimination of all line angles and undercuts. Final check-up.

STEP FORM INSTRUMENTATION

Step I, Disks: carborundum, steel, garnet.

Step II, Small heatless stones. Disks and various mounted stones.

Step III, Making of grooves, burs, chisels, v-files, v-scales.

Step IV, Burs, cleavers.

PULP PRESERVATION

We all agree that the preservation of the dental pulp should be the first consideration in all operative procedures, and every means at our command should be utilized for its protection.

Death of the pulp can be attributed chiefly to extensive tooth destruction, bacterial invasion, trauma, periapical infection and thermal electrolytic and systemic conditions.

The cause that chiefly concerns the bridgework operator is extensive tooth destruction. Our chief concern is minimal grinding of both structures, providing sufficient mechanical retention as an abutment for bridge support, and as nearly as possible conforming to the theory of extension for prevention.

The chief cause is largely careless operative procedures; namely, overheating of the tooth and possibly pulp exposure and infection.

It has always been my practice, before operating, to sterilize the mouth and all instruments as nearly as possible, and, after the teeth have been prepared, coating them with a varnish, covering the tooth with a temporary crown during the period while the bridge is being constructed. I have made many clinical and roentgenographic examinations of such teeth and find pulp disturbance rather rare.

BLOOD DYSCRASIAS AND THEIR RELATIONSHIP TO THE ORAL CAVITY*

By LEOPOLD LICHTWITZ,† M.D., New York City

PATHOLOGIC processes affecting the cavity of the mouth in diseases of the blood are chiefly atrophy of the mucous membrane, hemorrhage and necrosis.

In mentioning the diseases of lesser importance for the dentist, I would begin with pernicious anemia. During the early stages of this disease, and often preceding subjective and objective symptoms, there is burning of the tongue, of the mucous membrane of the cheek and of the gums. Red spots appear on the tip and edges of the tongue, becoming diffuse and dark, and there is dryness and cracking.

Atrophy of the mucous membrane develops—the so-called Mueller's or Hunter's tongue. Statements concerning the frequency of its occurrence differ. In my opinion, it is of universal occurrence, and its absence may render the diagnosis doubtful. This type of tongue may also be found in Bothriocephalus anemia. I have seen it also in a member of a family

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*Read at the Medical-Dental Conference, Montefiore Hospital, New York City, Dec. 12, 1933.

in which a case of pernicious anemia occurred. I treated it successfully with liver.

The condition known as Hunter's tongue generally disappears with recovery from pernicious anemia. Our knowledge about its pathogenesis is very meager. A nervous condition must be considered, as changes in the nervous system sometimes antecede the changes in the blood and the manifest anemia. This atrophy also occurs in the mucous membrane of the esophagus and of the stomach, reminding one of the changes in the epithelium occurring to a much greater extent in deficiency of vitamin A.

This suggestion is based also on the fact of the presence of Hunter's tongue

TABLE 1.—CLINICAL ENTITIES RESULTING FROM DISTURBANCE OF BONE MARROW FUNCTION

Erythrocytes: Cells	Erythrocytes: Hemoglobin	Granulocytes	Thrombocytes	Plasma-Proteins	Disease
−	−	−	−	− ± +	Panmyelophthisis (Aplastic anemia)
−	−	(−)	(−)	−	Pernicious anemia
−	−	−	−**	−	Terminal hemorrhagic state
±	−	± (+)	+	−	Chlorosis
±	±	−*	±	?	Agranulocytosis
±	±	−*	±	?	Infectious mononucleosis Vincent's angina Monocytic angina Typhoid fever (Substitution or irritation of lymphatoesis)
±	±	!	±	?	Chronic myelogenous leukemia (The primitive white cell increases but does not mature)
±	±	!*	−**	?	Acute myelogenous and lymphatic leukemia
(−)	(−)	(+)		+	Multiple myeloma
± −	± −	−*	−**		Aleukia
+	+	± +	±	+ ±	Polycythemia Erythemia
±	±	±	±	−**	Fibrinopenia
±	±	±	−**	±	Thrombopenia (Morbus maculosus werlhofii)

* Necrosis
** Hemorrhage

in sprue. This disease has a relationship to pernicious anemia on the one hand and to avitaminosis on the other. It is successfully influenced by liver therapy, and still more by the simultaneous administration of vitamin A.

Sprue, which is not at all limited to the tropics, causes another characteristic process in the cavity of the mouth—aphthae; hence, the term aphthae tropicae. According to Schueffner, sprue sometimes affects the cavity of the mouth only. I have seen cases of chronic and of perpetually recurring aphthous stomatitis and treated them successfully with liver.

In covering the effect of pernicious anemia on the cavity of the mouth, we should mention the bad condition of the teeth generally, and the swelling and bleeding of the gingiva sometimes to be found in this disease. Severe bleeding occurs in the final stage.

There is an extremely rare disease of the blood called congenital porphyria, in which the teeth and the bones become a red-brown through the deposit of porphyrine, which can be demonstrated spectroscopically in a microscopic preparation. By the injection of porphyrine in animals, this coloration of the teeth can be produced experimentally.

Pathologic processes in the cavity of the mouth, occurring in blood diseases and of much greater importance for dental therapy, are hemorrhage and necrosis.

The most important ingredients of the blood are formed in the bone marrow. This is true for the living cells of the blood, the erythrocytes and leukocytes of myelogenic origin, the granulocytes, and the platelets or thrombocytes, which possess a definite morphologic structure, though in mammals not the characteristics of a cell. And this is also true for the plasma proteins.

In the bone marrow, we have, therefore, at least four different products, the anatomic basis of three of them being well-known. There are the erythroblasts, producing the erythrocytes, the myeloblasts, producing the granulocytes, and the megacaryocytes, producing the thrombocytes. On which elements of the bone marrow the production of the plasma proteins is based is unknown; but the fact is established. Therefore, in multiple myeloma, we find an increase of plasma proteins. We find this also in cases of anemia (enterogenous anemia in stenosis of the rectum), chlorosis, monocytic angina and erythema exudativum. On the other hand, it is known that, in metastatic carcinosis of the bones, fibrinogen is wanting in the blood.

From this point of view, the formation of hemoglobin may also be considered as a special case of the formation of proteins. Normally, the production of hemoglobin has a fixed relation to the formation of red cells. In pathologic conditions, this relation is changed, this fact demonstrating the relative inde-

TABLE 2.—DIFFERENTIATION OF PATHOLOGIC PROCESSES

Increase of Number of Myelogenous Cells in Blood	Maturity of Myelogenous Cells	"Substitution" by Other Cells	Disease
+	—	0	Acute leukemia
—	—	0	Agranulocytosis
			Aleukia
—	—	+	Monocytosis

pendence of the production of hemoglobin and cells. This independence finds its expression in the color index and is of diagnostic value.

Normally, the composition of the blood in its cells and in its proteins is regulated. Regulation takes place primarily in the bone marrow, being performed by the regulating function of the autonomous nervous system and produced by hormones. Such a regulating system needs from the blood old and useless cellular elements.

The hormonal function of the spleen is diminished by severe hemorrhage. Therefore, loss of blood produces irritation of the bone marrow, rapid increase of granulocytes and thrombocytes in the circulating blood and a less rapid increase of the erythrocytes. This reaction, which shows the productive quality of bone marrow, is of high therapeutic, diagnostic

Table 3.—Differential Diagnosis in Hemorrhagic Diathesis

Symptom	Hemophilia	Thrombopenia	Thrombasthenia (Glanzmann)	Thrombopathia (Willebrand)
Bleeding time	±	Prolonged	±	Prolonged
Coagulation time	–	±		±
Agglutination of platelets	Prolonged	±		Prolonged
Retractibility		–	–	±
Time of thrombosis	±	Prolonged	Prolonged	?
Rumpel-Leede	O	+	+	+
Mechanic lesion	O	+	+	+
Heredity	+	O	+	+
Platelets				
Number	±	–	±	±
Size	±	+	(+)	(+)
Azure granular	±	–	–	(±)

for its purpose two working and balancing factors, the one for increase and the other for decrease. The increasing factor, as far as we know, for the red cells at least, is secreted by the stomach and liver. The spleen produces a substance diminishing the formation of erythrocytes, granulocytes and thrombocytes in the bone marrow. Besides this hormonal effect, the spleen has a clearing function. By its phagocytic qualities, the spleen removes and prognostic value. The nonappearance of this reaction in or after loss of blood demonstrates the complete loss of function in the bone marrow and the incurable final stage of the condition.

The four products of bone marrow certainly are in close connection with each other. Nevertheless, in pathologic conditions, because of exogenous factors and hormonal effects, we do not find increase or decrease of the four elements of ac-

tivity of the bone marrow simultaneously or equally. Increase of the one and decrease of the other may be noted.

The clinical entities resulting from this disturbance are indicated in Table 1.

The participation of the cavity of the mouth is marked by stars, one star showing the necrosis and two the hemorrhage. It becomes evident that loss of granulocytes causes necrosis and loss of thrombocytes causes bleeding.

Necrosis of the mucous membrane in the cavity of the mouth and elsewhere, from the slightest degree to the condition of noma, as occurring in agranulocytosis, panmyelophthisis (aplastic anemia), acute leukemia, aleukia, kala-azar, the necrotic angina of monocytous fever, etc., are caused by granulopenia. The immature leukocytes of myelogenous origin, the myeloblasts, have no granules. Therefore, in acute leukemia, in spite of the high increase in the number of leukocytes, the same consequences for the nutrition of tissues and for defense against infections follows, as in defects of myelogenic production, agranulocytosis for example.

On the basis of these facts and for a better understanding of the different clinical pictures and the well nigh indigestible nomenclature of hematology, we may differentiate the pathologic processes as shown in Table 2.

The activity of the myelogenous system may be impaired in relation to the production of cells and in relation to their maturity or in relation to both.

Tendency to hemorrhage depends on the number of platelets, and, peculiarly, on its critical value; i.e., 35,000 to a cubic millimeter. It took more than fifty years for the knowledge of the relation of the platelets to hemorrhage and blood coagulation established by Hayem, Denys and Bizzozero to become the foundation of the clinical aspect of hemorrhagic diathesis (Duke and Frank and Glanzmann).

The number of platelets produced by the megacaryocytes normally in the circulating blood are maintained at from 200,000-300,000. When azure stains are used, they show granulation. Megacaryocytes and platelets cannot perform their physiologic action without granulation. This action consists in the closure of the wound of a vessel. The white thrombus is formed by agglutination of thrombocytes. Fibrin is not present or at least is not traceable. The circulating blood contains the thrombocytes in a stable suspension. In uncoagulable blood, agglutination of platelets does not take place. Therefore, the first act in the method to count the platelets is the adding of sodium oxalate to prevent agglutination and coagulation.

The suspension and the stability of the platelets as well as of the erythrocytes are the result of an electric charge which is in harmony with the charge of the plasma proteins. This harmony is followed by absorption of plasma proteins on the surface of thrombocytes and red cells.

The electric charge of the different plasma proteins is different, being high in albumin, less high in globulin and very poor in fibrinogen. Therefore, the stability of the formed elements depends, not completely but to a certain degree, on the composition of the plasma. Approximately, these conditions become clear by determination of the blood sedimentation. This simple examination should under all circumstances in which thrombosis or hemorrhage is threatened, and therefore in dental practice also, be carried out.

It may appear surprising that Table 1, as far as it is concerned with hemorrhage, does not mention the bleeding diseases, the hemophilias, but is limited chiefly to defect of the platelets and their number or their structure.

Thrombopenia is identical with morbus maculosus werlhofii. There are two clin-

ical entities, the essential thrombopenia (E. Frank) and the hemorrhagic aleukia, with the related panmyelophthisis (aplastic anemia).

Essential thrombopenia appears as an acute, latent and relapsing or a chronic disease. It may appear in one organ or one tissue or in one region, for instance, the cavity of the mouth, and erroneously be taken for and treated as a local disease. It may be based upon constitutional conditions. But there is no evidence for heredity. Frequently, it follows bacterial infections. In the most severe degree, I even saw a purpura variolosa (variola). A severe and dangerous condition of this kind is caused furthermore by intoxication with benzene and arsphenamine and by roentgen-ray treatment. In infection, as well as in intoxication and damage by the roentgen-rays, the spleen is the location of the primary lesion. The thrombocytogenesis is a very vulnerable part of the bone marrow and therefore thrombopenia is sometimes the beginning of universal damage of the bone marrow, which may lead to panmyelophthisis.

The platelets are important, in relation not only to their number, but also to their azure granulations. Any defect of azure granulation is traceable by the examination of the bone marrow in biopsy or at necropsy, as well as in the circulating blood. There is an absolute analogy to the nonformation of granules in the leukocytes originating in the myeloid system. In both, deficiency of granule formation is identical with defective function. In thrombopenia, the failure of the megacaryocytes leads to the appearance of giant platelets in the circulating blood.

Thrombopenia is a frequent and, for the dentist, a very important kind of hemorrhagic diathesis. It is also important in relation to therapy. In thrombopenia, the aim of therapy is to increase the formation of platelets. Extirpation of the spleen is the most effective method, recommended and first performed by Kaznelson, and approved as an emergency method in many cases. We are dealing here with an extensive operation. Severe and dangerously sick patients should be given a transfusion before this operation, to insure a substitution of platelets. Simultaneously, a disturbance of the formation of platelets may precede extirpation of the spleen. Less effective methods for the correction of this disorder, as far as the condition of the patient permits a delay, are nonspecific irritation, the injection of epinephrine and roentgen-ray irradiation of the spleen. Every therapeutic administration is aided because irritation of the bone marrow develops as a reaction to the loss of blood. If, in the severest damage of the bone marrow, its irritability has come to an end, every therapeutic method, even the extirpation of the spleen, is without effect.

Extirpation of the spleen must be based on an exact diagnostic differentiation of thrombopenia from all other kinds of hemorrhagic diathesis, the hemophilias and Schönlein-Henöch purpura or capillary toxicosis, and also from the hemorrhagic diseases caused by dysfunction of the platelets, the hemorrhagic hereditary thrombasthenia (Glanzmann's) and the constitutional thrombopathia (Willebrand's). These, at least the second one, are not operable. Table 3 shows the differential diagnostic features following the dynamic examination of the blood and a study of the platelets and heredity.

A summary may be sufficient for the understanding of the clinical picture. The thrombopathia (Willebrand's) seems to be a particularly dangerous form of hemorrhagic diathesis. A relatively high number of deaths by loss of blood and also following the extraction of teeth have been reported. In thrombopenia, bleeding is produced from the thin cuti-

cula leading from the gum to the teeth, the gingiva being normal. In Willebrand's disease, the gingiva is spongy and inflamed, as in scurvy. From this, it becomes evident that here we are dealing with a simultaneous affection of the capillaries.

In hemophilia, and in diseases caused by damage of the platelets, there is a periodicity, the reason for which is unknown.

Table 3 shows a far-reaching differentiation of hemorrhagic disease. (Perhaps the zeal of the authors went too far.) The platelets have two different functions as preventives against loss of blood: agglutination (the defect of which may be the responsible factor in the cases of Willebrand) and the retraction of the coagulum (the failure of which may cause Glanzmann's disease).

The differential diagnosis of the bleeding caused completely or chiefly by affection of the capillaries is less complicated. Here, we are dealing with manifestations of allergic hypersensitiveness. Here, the essential phenomenon is an exanthem, the hemorrhagic character being of secondary importance. In the same manner as an urticaria, even an urticaria factitia may be of the hemorrhagic brand.

We may follow the differentiation so far as to recognize different factors, but we must be careful not to differentiate diseases too sharply. System is useful for research and education, but it encourages onesidedness. The processes in living organisms are coordinated and depend on each other. This is also true for the processes of bleeding and the prevention of bleeding.

This can be seen in the hemorrhage of anaphylactic shock. Here, the permeability for plasma proteins as well as for erythrocytes in the capillaries is affected, but simultaneously the spleen and, directly or indirectly, the bone marrow. Hence, the decrease of granulocytes, thrombocytes and the lessened coagulibility of the blood. The stability of the blood plasma and the stability of the suspension of the formed elements of the blood depend on a number of conditions, one being that of the wall of the vessels—its endothelium as well as the intra-endothelial substance.

The system as a unit, with all its different factors, reacts in a coordinated manner and may be affected by the same damage in different parts, and also in the capillaries, as in anaphylactic shock and, as mentioned above, in Willebrand's disease. There is also in thrombopenia a capillary factor. An understanding of these symptoms of coincidence of different types of hemorrhagic diathesis in the same person or in a family is possible only by correlation.

AGRANULOCYTIC ANGINA—ITS ORAL MANIFESTATIONS*

By HENRY A. MARK, A.B., D.D.S., Jacksonville, Fla.

SYSTEMIC disease frequently reveals itself by oral conditions. The patient who comes to the office or hospital seeking advice, "for spongy, painful, bleeding gums," could be spared much suffering, if dentists were to think in terms of general, rather than local, disease entities. This is especially true of that large group termed blood dyscrasias, of which agranulocytic angina is a member. In this condition, local treatment is ineffective and seldom palliative, and procrastination inevitably fatal. In a review of the dental literature of the past ten years, only one report[1] describing this condition was found.

Agranulocytic angina has been defined, "as a symptom-complex characterized (*a*) by peculiar, ulcerative, necrotic or gangrenous lesions, occurring usually in the mouth or throat, (*b*) by the almost complete absence of polymorphonuclear cells from the peripheral blood and (*c*) by, in most cases, a rapidly fatal course."[2] It is usually found in the female sex past the third decade of life. The exact cause of this syndrome is unknown, but recent investigations have shown certain conditions present. During the past year, Randall,[3] Madison and Squier,[4] Kracke[5] and others have shown a relationship between the administration of amidopyrine and the barbiturates in combination, e.g., allonal, luminal, and the onset of this symptom-complex. Whether these are predisposing, contributing factors in the disease or merely coincidental is a matter for conjecture. Other investigators (Jackson, Merrill and Duane,[6] Thompson[7]) have demonstrated an interesting relationship between the hormones associated with menstruation and the neutropenic episodes.

The symptoms are those of a general acute infection, fever, malaise, headache

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and mental confusion, plus a characteristic soreness of the mouth and throat and a dysphagia.

The diagnosis is made on the history, oral examination, smear and blood tests. The oral cavity exhibits peculiar ulcerative, sometimes gangrenous lesions, frequently resembling those of an acute Vincent's infection. Occasionally, the fusiform bacillus and the spirochete of Vincent may be found, serving to cloud the picture.

The blood picture is characteristic, showing a progressive fall in the total number of white cells, sometimes to under 1,000 per cubic millimeter. The drop is almost wholly due to a dimunition of polymorphonuclear leukocytes, which may be entirely absent. The other blood elements are practically normal.

The disease is usually fulminating. It may last from several days to many weeks. Remissions have been known to occur occasionally. The prognosis is always grave and the mortality is said to range from 85 to 90 per cent. There is no specific treatment. Injections of pentnucleotides, repeated blood transfusion and mild irradiation of the long bones have failed to produce a cure in most cases. The use of liver extract has been suggested.

I have observed four cases of this condition, of which two are reported as of interest from the dentist's point of view.

REPORT OF CASES

CASE 1.—I. S., a white woman, aged 42, was admitted to Kings County Hospital, April 11, 1933, complaining of extreme soreness of the mouth and general malaise. Admission diagnosis was gangrene of the upper jaw.

The patient stated that April 6, she noticed swelling of the roof of her mouth and soreness of the gums. April 7, the face began to swell, the swelling being especially prominent beneath the eyes and involving the upper lip. Oral examination revealed a heaping-up of the gum tissues labially and the presence of a gangrenous area extending from the upper first bicuspid on the left to its fellow on the opposite side. On the roof of the mouth was seen a swollen, oozing, necrotic area which extended from the left bicuspids to the center of the hard palate. This process involved the posterior portion of the palate for a short distance and turned laterally to include the right bicuspid region. The upper six anterior teeth were mobile. A marked fetor oris was present. The tongue was normal in appearance and protruded in the midline. Cervical and generalized adenopathy was absent. There was edema of the face, more marked on the left side, infra-orbitally, just anterior to the maxillary sinus. The upper lip was swollen, excoriated and discolored. The spleen was palpable. A generalized faint macular rash was present and a thrombosed, infected hemorrhoid was noted. The white cell count was 3,500, with 13 per cent polymorphonuclear leukocytes, dropping the next day to 2,500, with 11 per cent polymorphonuclears. The patient had four blood transfusions and was given pentnucleotide intramuscularly, two or three times a week. The temperature varied between 99 and 105 F. The hematopoietic system responded somewhat to therapy, the last being 5,050 with 62 per cent polymorphonuclears. The patient grew progressively toxic and increasingly cachetic, dying sixty days after admission.

CASE 2.—R. P., a white woman, aged 39, was admitted to Kings County Hospital, March 17, 1934, complaining of sore mouth and throat of four days' duration. She was apathetic and mentally confused on admission, accurate history taking being difficult.

For the past three or four months, she had been troubled with social difficulties. To relieve her "nervousness," she had taken very large doses of allonal, pyramidon and the barbiturates. Four days prior to admission (March 13), she complained of sore throat, which was diagnosed by a private physician as tonsillitis. Her condition grew worse and she was admitted to the hospital for medical observation.

Oral examination revealed a lesion on the outer aspect of the lower lip, which was partly ulcerated and covered with a serous exudate. Extending backward from this lesion to a point adjacent to the first molar tooth, the mucolabial and buccal folds presented a yellowish gray, nonulcerated appearance, which suggested a caustic burn. These lesions grew progressively worse and gangrenous, having the appearance of a noma. There was a bilateral follicular tonsillitis, with swelling and injection of the peritonsillar region. The nasopharynx, the soft palate and uvula were also inflamed. A grayish white membrane extended from the left side of the uvula to the surface of the left tonsil, which did not bleed on removal. A smear of this membrane was reported negative for diphtheria. It was learned that the patient had used potash as a mouth wash, and it was thought that the lesions on the lower lip, mucolabial and buccal folds were the results of a chemical burn, and that the membrane involving the oral pharynx and tonsil was the remnant of a sloughing mucous membrane.

Fig. 1 (Case 1).—Lesions appearing on labial surface, showing heaping up of gum tissue and presence of gangrenous area extending from upper left first bicuspid to upper right first bicuspid. The six anterior teeth were mobile.

In addition to the lip and intra-oral lesions, the patient presented a reddened, nontender, sharply demarcated area, roughly circular in outline and approximately 2 by 3 inches in diameter, and situated on the lower left jaw. The left submaxillary glands were moderately enlarged and tender.

The patient's course in the hospital was rapidly down hill, with a temperature varying between 101 and 107 F. The white blood cells ranged from 3,000 per cubic millimeter on admission, to 1,000 per cubic millimeter. There was a complete absence of polymorphonuclear leukocytes. In spite of vigorous pentnucleotide therapy and repeated blood transfusions, the patient died, March 21, four days after admission.

SUMMARY

There are an increasing number of cases of agranulocytic angina apparently following the ingestion of amidopyrine or its compounds.

The frequency of the mouth lesions as the first clinical phenomenon and the rapidly fatal progress of the disease make it imperative for the dentist to be wary of treating ulcerative, nonspecific lesions of the oral cavity locally, and to cooperate with the physician in ruling out the possibility of a blood dyscrasia.

424 West Sixth Street.

Fig. 2 (Case 1).—Appearance of inside of mouth, showing swollen necrotic area of hard palate.

DENTISTRY IN RELATION TO DISEASES OF THE HEMATOPOIETIC SYSTEM*

By THOMAS F. CODY, D.M.D., Boston, Mass.

THE subject of the blood dyscrasias merits all of the light that can possibly be focussed thereon in order that we may arrive at a broader understanding of a condition that so vitally concerns all of the professions engaged in the alleviation of human suffering; and that not only our defensive, but especially our offensive mental armamentarium, may be the keener edged for the combat with these diseases.

The articles which have appeared in the literature in the past few years relative to agranulocytic angina, while not very numerous nor very impressive from the scientific point of view, have been exceedingly divergent, not only diagnostically, but also prognostically, and therapeutically as well as geographically. Some of those treatises have been very brief, conveying not much more than a recognition of the disease. Others have been quite lengthy and covered in detail all of the scientific knowledge so far accumulated on the subject of agranulocytic angina. All of the treatises which have so far appeared in the scientific journals were supplemented by case history reports. Most of these were published in the medical journals, with some reprints in the dental magazines. Worthy of mention in the latter publications were two original papers which were complete and comprehensive.

The later editions of the various textbooks on pathology, hematology and therapeutics now present a brief treatise on this fascinating study of a grave disease. One could write a volume about it with much more ease than make a compend of it.

In the following outline, I have attempted to give what I believe to be the essential factors, as propounded by the leading internists and investigators, in the clinical picture of a certain group of diseases of the hematopoietic system, or hemorrhagic diatheses, which present a similarity of syndrome, one to the other, with special reference to agranulocytic angina.

This subject was chosen for presentation for the following reasons:

1. It is a comparatively new subject dealing with the study of a very grave disease and which has not been discussed before and has only been recognized within the past few years as being a distinct pathologic entity. The primary symptoms and lesions of agranulocytic angina, which may appear in the oral cavity of a patient affected, may come under the observation of a dentist before it comes to the attention of a physician. It is then imperative that the knowledge of the former, in the matter of so serious a malady, be not secondary to that of the latter; which makes the study of this disease of vital concern alike to the practioner, teacher and student of dentistry.

2. A case recently came to my atten-

*Read before the Robert R. Andrews Society of the Tufts College Dental School, Nov. 2, 1933.

tion which had a sudden onset and an equally sudden fatal termination; meantime giving me an opportunity to study first hand the train of symptoms of this disease from its beginning to its end.

3. I hope to add another link in the chain of unity which binds dentistry to medicine. The path of progress of the former must lie in the same plane as that of the latter. The study of dentistry must embrace the same fundamentals as that of medicine. No progressive mind, in either field, can accept less or would have it otherwise. I know that it is repetitious to state that if one is called on to diagnose or treat intelligently a disease in one part of the body, a thorough understanding of pathology is necessary in order to evaluate the symptoms that this disease may manifest in other parts of the body and its influence on the body as a whole.

I shall review briefly some major pathologic conditions which present an almost identical clinical picture to that of agranulocytic angina.

Hemorrhagic purpura, known also as Werlhof's disease, was first described in 1740. The term signifies hemorrhages in the skin, mucous membranes and viscera. Steadman defines the disease "as one of infection." According to our present knowledge, it is idiopathic. It is rarely hereditary or familial. The disease may be acute and fulminant, and may terminate fatally in the course of a few hours or a few weeks. Some cases may be classed as chronic or intermittent, the attacks occurring at certain periods when the platelet count is low.

CLINICAL PICTURE IN AN ACUTE CASE

The symptoms may be viewed both objectively and subjectively. The patient may complain of fever, headache and prostration, depending on the amount of hemorrhage. Hemorrhages usually occur from the nose and mouth, especially around the gingival margins of the gums; and from the stomach, intestines and kidneys. Examination of the body reveals multiple petechiae patches covering the skin, especially on the lower appendages, or they may even merge in large areas of ecchymoses.

BLOOD PICTURE

There is generally an erythropenia and secondary anemia, as should be expected, due to the hemorrhages. There may also be slight leukopenia, but generally there is leukocytosis. The most striking phenomenon of this mysterious malady is the remarkably low platelet count. I have seen in a case of hemorrhagic purpura, of which I will speak later, a count around 60,000 per cubic millimeter. According to Hunter, platelets "consist of portions of cytoplasm of the megakaryocytes that have become separated from the main cell body in the bone marrow." Function demands that they play an important rôle in the formation of fibrin. If they are removed from the blood, the power of coagulation is lost; which accounts for the hemorrhages already referred to under the heading "clinical pictures," and which gives the disease its name "hemorrhagic purpura."

Unruptured platelets agglutinate when they come in contact with a vascular defect in conjunction with other cells and fibrin, and aid in the formation of the clot. In hemophiliacs, for example, the blood count may be normal and also the platelet count, but the platelets in this disease are said to be "resistant." They lack affinity for agglutinins, and consequently we have hemorrhages after injury.

REPORT OF A CASE

A. von G., a patient at the Presbyterian Hospital, New York City, was under close

supervision from the time that he was 12 years of age until he died, at the age of 19. His record shows that he first appeared in the outpatient department in 1919 because of petechiae patches. He was hospitalized for observation and treatment in the medical ward for a period of three months, and was then transferred to the surgical ward for splenectomy. It had been decided that surgical interference held the only hope of recovery. On the basis of theoretical teaching, substantiated by experimental facts, it appeared that the spleen was the organ directly concerned in the destruction of the blood platelets and was consequently the etiologic factor in this case of hemorrhagic purpura.

The patient recovered and, in two months, he was discharged to his home, with definite orders to report at intervals to the outpatient department for continued observation.

Ten months from the date of discharge, the blood picture, including the platelet count, had returned to normal. The petechiae patches had entirely disappeared and the boy felt very well. In the fall of 1922, he entered a Brooklyn high school, graduating in the summer of 1926. During his course, he became an outstanding all-round athlete and football player. He excelled in his studies. He matriculated at New York University for the fall term, to prepare for the study of medicine.

Aug. 1, 1926, the boy again reported to the hospital, quite alarmed because hemorrhages had suddenly reappeared on his skin. He was immediately admitted to hospital, where he died nine days later, of intracranial hemorrhage. In the meantime, he was given four blood transfusions and everything that medical science could do for him was done.

On his entrance, the patient had hemorrhages from the nose and gums. An acute sore throat developed. Smears showed an abundance of Vincent's organisms. The hemorrhage extended into the sclera of the eye. Death ensued from intracranial hemorrhage. Necropsy was refused. In this particular case, the efficacy of splenectomy seemed evident for nearly seven years, the fatal termination proving otherwise.

This particular case has been much discussed in medical and surgical publications, with the result that operations of this type will no longer be resorted to as a therapeutic measure in cases of hemorrhagic purpura, at least in the Presbyterian Hospital.

LEUKEMIA

Leukemia is included under the heading of blood diseases, but it does not belong there, being a disease of the hematopoietic system rather than of the blood itself. Osler defines it as "a disease characterized by an apparent permanent increase of the leucocytes of the blood associated with a hyperplasia of the leucoblastic tissue." Boyd defines it as "a condition where there is a proliferation of the leucoblastic tissues of the body either myeloid or lymphoid." Whatever the definition, this condition remains the most mysterious and most certainly fatal of the so-called blood diseases.

Leukemia is classified under three main headings:

1. *Myelogenous Type.*—The outstanding clinical picture here is the abnormally enlarged spleen, the enlargement sometimes causing intestinal obstruction, distinctive pallor, dyspnea and rapidity of the pulse, which is soft and compressible. Hemorrhages from nose and gums are common. Nausea and vomiting are early features, with ascites, etc.

The blood picture is always of a severe anemia with a strikingly high white count of 50,000 to 80,000 per cubic millimeter, with 90 per cent polymorphonuclears and myelocytes. The platelet count may be either normal or increased. The ratio of white to red cells may be 1:5 or may even reach 1:1.

2. *Lymphatic Type.*—The acute type is the most terrible of all blood diseases.

occurring chiefly in young people, mostly in males, with a fulminating onset, terminating fatally in from one to three weeks. Generalized glandular enlargement, hemorrhages from the gums and mucous membranes, marked fetor oris, Vincent's infection and a diphtheroid throat are symptoms. Some cases resemble a fulminant purpura.

In all forms of the disease, the blood picture alone offers the only distinct diagnostic features. The leukocyte count may run from 100,000 to 200,000 per cubic millimeter and may reach to above 1,000,000, with the large lymphocytes usually over 90 per cent of the total and showing no granules.

CLINICAL PICTURE

The chronic condition is less common than the acute and may run a course of from three to thirteen years, according to Osler. It occurs in older persons and very rarely in youth. There is a general enlargement of the lymph glands, but the spleen shows little enlargement. After a period, the chronic type develops into an acute condition. The skin generally shows pigmentation and itching, with urticaria present; a picture somewhat similar to that of Hodgkin's disease.

In the initial stages of the disease, there may be little or no anemia. The white count is usually above 100,000 per cubic millimeter with small lymphocytes 90 to 95 per cent of the total, the reverse of conditions in the acute type, in which the large lymphocytes predominate.

3. *Aleukemic Leukemia (Atypical Types).*—These cases are generally characterized by a leukopenia, in contrast to the other types. The cell forms may be part lymphoid or part myeloid in character, with a blood picture also atypical. It must be apparent from the nature of these diseases that any detailed discussion as to their treatment does not come within the province of our work. The utter hopelessness of attempting to cure the mouth lesions which manifest themselves in these diseases, by local means is only too evident. Therefore, I repeat that a thorough knowledge of the underlying etiology and symptomatology is of vital importance in any therapeutic procedure which may be instituted, and which is only, at best, palliative.

PROGNOSIS

It is sufficient to say that the prognosis, in all forms, is a fatal termination. Both histologically and biologically speaking, leukemia may be regarded as a true neoplasm of the hematopoietic tissues of the body rather than a blood disease itself.

ANEMIA

Anemia is defined as a condition in which the blood is reduced in amount or is deficient in red blood cells and in the hemoglobin content, manifested clinically by pallor, shortness of breath and palpitation. Blood pictures of this condition need no mention here. I merely wish to suggest the different blood changes occurring in a certain group of diseases which simulate the principal condition to be discussed; for in the formed elements of mammalian blood, the third portion is composed of platelets, the number normally running from 180,000 to 800,000 per cubic millimeter. They are absent from blood of birds, fish, frogs and the whole reptilian group. Generally speaking, in pernicious anemia, while the red count and hemoglobin index is lowered, the platelet and white count may be either increased or diminished. In chlorosis, the red count is high, but the hemoglobin index is remarkably low in proportion to the number of red cells. The platelet count is increased.

Pernicious or Addisonian Anemia.—This is a disease of a recurring type and usually of fatal termination. It is caused by hemolytic agents and characterized by an embryonic type of hematopoiesis. "The nature and origin of these hemolysins are unknown." The clinical symptoms are quite evident. The skin presents a yellowish tint, or pallor, as a rule. The lips and tongue and gums seem waxy and bloodless. The platelet count is low, 100,000 or less per cubic millimeter and the white count diminished. The most striking blood condition in this disease is the high hemoglobin index in proportion to the number of red cells.

Aplastic Anemia or Malignant Thrombopenia.—This condition has a clinical picture identical with that of agranulocytic angina. The disease is a subtype of pernicious anemia and manifests itself as such, except that its course is more rapid and more surely fatal.

The blood picture, here, shows a rapid progressive fall in red cells with a corresponding drop in hemoglobin. Piney states that, in the terminal stages of this disease, the red cells may drop to the surprisingly low count of 500,000 and the white cells to 500 per cubic millimeter. There is also a correspondingly rapid decrease in the number of platelets. In observations made, just before death ensued, the platelets had disappeared entirely from the peripheral blood. Osler reports that in a study of eighty-one cases, the average red blood count was 1,575,000 per cubic millimeter, while the lowest red blood count was 143,000 per cubic millimeter. Nucleated red cells are always present in variable numbers.

Postmortem examination revealed aplastic bone marrow instead of an active hyperplasia and a progressive wasting of the myeloid substance. The disease is a true leukopenia. Some of the causes are as follows: benzene poisoning, arsphenamine poisoning, recurring secondary hemorrhage, sepsis and deep roentgen-ray exposure.

The clinical symptoms are a severe anemia with a peculiar blood picture; a hemorrhagic purpura (which simulates the disease of that name already discussed), and a diphtheroid character. There may be extensive hemorrhage from one or more mucous surfaces, especially from the gums. There is an acute ulcerative stomatitis of the nature of a Vincent's infection and which usually follows the onset of the disease, prostrating the patient in a few days.

There are other conditions which come under the heading of hemorrhagic diathesis.

HEMORRHAGIC DIATHESIS

Benzene poisoning, a very important disease in industrial medicine, was studied by Selling, who proved pure benzene to be very toxic to bone marrow. This disease is generally found in young women working in the benzene laden atmosphere of rubber works. The clinical and blood pictures simulate those of aplastic anemia, agranulocytosis and leukopenia. On account of the mouth lesions manifest in this disease, a dentist is quite likely to see a patient before a physician does. Therefore, it is not only essential but absolutely imperative that the former be as conversant with the clinical manifestations and their sequelae as is the latter, so that the two may cooperate for the benefit of those so afflicted.

There are also the diseases of a parasitic origin which simulate those already spoken of. I shall just mention kala azar or leishmaniasis. We are not concerned with this disease, which, except for the similarity of its clinical symptomatology, as well as that of its microscopic blood picture, is a marked anemia and leukopenia. Enlargement of the spleen is al-

ways constant, being similar to that of leukemia, with marked emaciation. The disease is widespread in the southern Asiatic countries. The causative agent is a protozoan of constant form living in the human spleen and bone marrow and said to be transmitted by the bedbug and dog flea to human beings.

AGRANULOCYTIC ANGINA

I hope that from the preliminary treatise and correlation of the subjects discussed, a broader concept will be had of the main topic as well as a clearer idea of the symptom complex and the similarity of lesions produced by the diseases already mentioned. Earlier clinicians failed to make a diagnosis of what is now known as a distinct pathologic entity. To the science of hemotology, which has made such remarkable progress during the past decade, belongs the credit for the diagnosis and classification of grave disease under the heading of the blood dyscrasias. The literal meaning of the word agranulocytic, as defined by Steadman, is "cells without granules." Angina means "a sore throat, a pain from any source."

Cecil defines the condition as follows: "The absence or deficiency of granulocytes in the blood is always abnormal. A symptom complex characterized by a peculiar ulcerative, necrotic or gangrenous lesion occurring usually in the mouth or tonsils. The complete absence of polymorphonuclear cells from the peripheral blood stream. A sudden fulminating onset with a negative past history and without any apparent cause of either external or internal influences. A rapidly fatal course in over 90 per cent of the cases occurring, mostly, in from two days to two weeks."

History.—In 1922, a clinician and investigator by the name of Schultz recognized a group of cases which presented an atypical syndrome with a negative past history. A sudden onset of pyrexia, chills, malaise, jaundice and necrosing of tonsils, mouth, soft palate and pharynx was recognized in all cases. This condition, he believed, manifested itself entirely among females who had reached the menopause stage in their life cycle, and was of endocrine (ovarian) etiology; while the mouth and throat manifestations, with the angina, were of secondary importance. Of course, it is now well-established that this is not the case. The present-day literature contains reports of the disease occurring from infancy to extreme old age, involving both of the sexes and with an atypical syndrome. But Schultz will always be recognized as the first to discover the abnormal blood picture, to describe the symptomatology and to give the disease its name. He further believed that he was dealing with a distinct pathologic entity and not a complex.

Brown, in 1902, reported in *American Medicine* a fatal case of acute infectious pharyngitis and leukopenia. Schwartz, in 1904, and Turk, in 1907, reported similarly. The literature, as far back as 1857, contains evidence of the recognition of this disease, but with a different terminology and point of view. In the necropsy findings of the late 1900's, the condition of the bone marrow was associated with an acute septic throat condition and stomatitis. With this history in mind, it must be apparent that we are not dealing with a new disease, but with an old one camouflaged by a new terminology.

In the *American Medical Association Journal* of 1926, a survey was made by Hunter of all the cases which had been reported up to that time, only twenty-six. This was the first complete report and evaluation made. Of these cases, 100 per cent were reported fatal.

In 1927, Kastlin reviewed all the cases

recorded up to this time, only forty-three.

In the *American Journal of Diseases of Children,* November, 1929, the youngest case on record was reported, from Japan, in a boy, aged 4 years. The clinical and blood pictures were typical of this disease, with fatal termination in nine days. Up to that time, only five cases in children had been reported, all in boys, the oldest being 7 years old.

Statistical Studies.—The disease attacks females in the ratio of 4:1, 50 per cent of the cases occurring in middle life. It runs a course of from four to ten days. The shortest fatal case of the disease was sixteen hours. The longest course of an attack was ninety days. Dameshek and Ingal, of Boston, made a statistical study of all cases reported up to 1931 and found a mortality rate of 90 per cent. Taussig made a similar study of 340 cases, which had been reported up to July, 1931. His findings were that the disease had a mortality rate of 80 per cent, 10 per cent less than that reported by Dameshek and Ingal.

Etiology.—Several theories have been advanced to date, but none definitely established. Some of the causes stated are endocrine disturbance, chemical poisoning, such as from benzene, thorium and arsphenamine, and typhoid inoculation. That the disease is related to leukemia is substantiated by the findings of some clinicians who say that "it is a disease of the hematopoietic system emanating from a primary focus in the mouth and throat." Others take the opposite view. Studying the disease from the bacteriologic point of view has so far been barren of any definite findings. Blood cultures have shown a variety of organisms, in a third of the cases cultured, ranging from the pneumococcus, the streptococcus and *Staphylococcus aureus,* to Friedlander's bacillus, the colon bacillus and *Bacillus pyocyaneus.* Smears taken from the mouth and throat lesions have shown Vincent's organisms in most cases, but not in sufficient numbers to warrant etiologic emphasis.

Irradiation by radium and the roentgen rays, especially prolonged exposure; aplastic anemia without an acute terminal infection; aleukemic leukemia with or without acute terminal infection; bizarre anemias; infectious disease associated with or following leukopenia; typhus, typhoid, dengue, splenomegaly and pneumonia are some of the causes advanced by Robert Kracke in 1930 and by Rosenthal in 1931. The most accepted theory is that the disease is an atypical reaction of the blood-forming system to the presence of bacterial toxins, with an especial affinity for the granulocytic cells, or to atrophy of the system because of the infection.

Necropsy.—Principal changes occur in the bone marrow, which shows a marked redness, the usual number of erythrocytes, erythroblasts and lymphocytes and absence of the granular series. The spleen is not enlarged as a rule. Artificial ulcers have been found in the stomach and on the genitalia and a peculiar necrosing of the throat and mouth.

Clinical Manifestations.—The clinical manifestations are usually atypical. The morbid signs already referred to may or may not be present, but the mouth and throat lesions are present in a great percentage of the cases, according to Boyd. The disease is very apt to be confused with aleukemic leukemia, aplastic anemia or any one of the diseases associated with leukopenia. Boyd also states that it is not yet established which is the primary manifestation, the agranulocytosis or the angina. The former may expose the body to an acute infection. The latter may have an influence on the myeloid cells of the bone marrow due to the infection and toxemia of the throat.

In the *International Medical Digest*, December, 1932, McDonald states:

A diagnosis can only be made after a careful study of the blood picture together with the accompanying symptoms complex of the case at hand. It is difficult to differentiate it from aplastic anemia. The sudden onset, chill, fever, degree of prostration, ulcerations of the mouth and throat; with this and the blood findings in mind, one should at least suspect the disease.

These are his conclusions from a study of five cases.

You now have a mental picture of all the other related diseases to help you differentiate the syndromes before attempting even a tentative diagnosis.

REVIEW OF CASE HISTORIES

1. *The New England Medical Journal*, June, 1931, contained a report of four cases that had several points in common. All four showed a blood picture of agranulocytosis, a leukopenia with a sudden onset and marked prostration and a diphtheroid pharynx, and had a fatal termination.

The conclusion drawn from these four cases was "that agranulocytosis is an abnormal response of the body to a toxic stimulus and calls for great prognostic caution on the part of the clinician regardless of the findings."

2. *The California and Western Medical Journal*, June 1931, reports a case of a man, aged 70, who never had had any illness except typhoid several years previously and was well developed, well nourished and vigorous for his age, who was admitted to hospital for treatment for burns on the arms and legs. On admittance, he had a very septic mouth. After his forty-seventh day in the hospital, he developed agranulocytic angina, dying eight days later. The noteworthy feature of this case was that the disease, agranulocytic angina, occurred while the patient was hospitalized for treatment for burns. The patient's blood picture on entrance showed a normal amount of granular cells, disproving one theory that agranulocytosis is due to complete hypoplasia of the bone marrow.

3. *The Illinois Medical Journal* reports a case of an Italian woman, aged 43, who showed the regular symptoms and blood picture, with fever 103. She was given six transfusions of 30 c.c. of her husband's blood for six days running, and liver extract intravenously, with recovery.

A 16-year-old white girl, whose white count went down to 700 with the usual absence of granulocytes, was given four transfusions of citrated blood in a 1 per cent solution of mercurochrome. The throat smears showed gram-negative diplococci predominating. The patient died.

A white boy, aged 13 years, with a tuberculous sacroiliac joint had the typical blood picture. He died in three days.

A white woman, aged 52, with diabetes, had experienced weakness for two weeks. She had never taken insulin. She died in fourteen hours after admission to hospital with a clinical and blood picture characteristic of the disease.

A white woman, aged 41, whose blood picture showed a positive leukopenia and absence of granulocytes, was given three transfusions. She died in ten days.

A girl, aged 17 years, well developed but anemic, was given four transfusions. She died in six days. The white count was 280. At her death, there was a complete absence of granulocytes from the circulatory blood.

So far we have heard only of cases of the acute type. In the *New England Medical Journal*, Feb. 23, 1933, there is a report of a case that is termed as of the relapsing type of agranulocytic angina.

The patient, an American woman, white, aged 32, began to complain in 1931. She had chorea at 12 years of age. She married at 16. There had been no pregnancies. Tonsillectomy was performed at 27. Six months previous to her present complaint, she had a bad mouth condition, diagnosed as Vincent's infection. She was given two injections of silver arsphena-

mine, which cleared up the mouth condition in a few days. She felt very well until January, 1931, when she complained of a sore throat. Ulcers appeared on the tongue and gums, followed by weakness and dizziness. Two days later, the mouth and throat lesions became necrotic. The temperature was 105.

The conclusion drawn from this case of the relapsing type is that the two major and two minor attacks resulted from the injections intramuscularly of silver arsphenamine, which seemed to exert a depressive action on the bone marrow. This fact has been observed and substantiated by several clinicians, other than Millian and Furgo, who reported the case; and the fact that the chief seat of the pathologic process in agranulocytic angina is the bone marrow. They conclude by saying that "the patient is now very well, but other attacks may follow."

Amolsch and Stellhorn, of Detroit, write of five cases which they studied first hand and which had not been reported in any of the scientific journals. The report of these cases was in pamphlet form mailed to Tufts College Medical Library.

The pathologic features in this group of disease conditions consist of stomatitis, necrotic ulcers, occurring in the mouth, larynx, and esophagus, with certain cases showing non-reactive ulcers in the gastrointestinal tract and the female reproductive system. Petechial hemorrhages have been described in a small per cent of the cases. While the clinical features, blood picture, and gross morbid anatomy of the disease are well established, little or nothing is known of the etiology, pathogenesis, or minute cellular pathology. Bacteriological study has not been productive of definite results.

Four of the patients were of a well-developed and well-nourished type. Two had a negative past history. Three presented evidence of recent severe infections such as gallbladder disease, arthritis, antral infection, tonsillitis and severe head colds. All cases were characterized by sustained high fever and marked exhaustion, with the usual absence of granulocytes from the peripheral blood stream and, in four of the cases, a pronounced necrotizing ulcerative throat.

CASES IN BRIEF

Case 1. White, female, American, aged 45, died after eight days' illness.

Case 2. White, male, American, physician, aged 35, died after six days' illness.

Case 3. White, male, American, clergyman, aged 35, died after sixteen days' illness.

Case 4. White, male, Italian, fireman, aged 21, died after seven days' illness.

Case 5. White, female, American, aged 54, died after four days' illness.

SUMMARY

Five cases of agranulocytosis are reported with necropsy obtained in four cases. The factor common to all cases is the profound loss of granular leukocytes. Four cases had typical necrotic ulcerations of the throat. Four cases presented acute clinical features with rapidly developing blood changes. One case did not present fulminating clinical or blood features. Marked variability of certain features of the disease are encountered.

Reznikoff, in the *Yale Journal of Biology and Medicine,* says:

There is a differentiation between the neutropenia of infections and from infectious mononucleosis and aleukemic leukemia as revealed from the studies of the haemogram, i.e., in agranulocytosis the neutropenia is due to a depression of the entire maturative cycle as well as the entire stay of neutrophils in the blood stream.

In the other two conditions mentioned, the young neutrophils appear in the blood stream in great numbers, with an associated anemia.

Bulmer, writing in the *London Lancet,* says:

There are two types of the disease en-

countered: true agranulocytic angina, for which no cause can be found; and malignant neutropenia, in which a failure of the polymorphonuclear leukocytes (granulocytes) is secondary to an obvious acute infection.

He reports a case which came under his supervision, Feb. 3, 1933, that of a woman of 27, with a negative past history and "in her usual good health" until the date mentioned.

The patient complained of severe pain in her gums which increased in severity during the next two days. The patient was unable to sleep. On the afternoon of the fifth, in consultation with another physician, the patient looked ill. Her temperature was 101 degrees; the gums of the upper jaw were hyperaemic; the interdental papillae swollen. There was not any ulceration of the mouth, but in the neck and axillae there was a diffuse adenitis; the spleen was impalpable. The leukocyte count was 3,000 per cubic millimeter. The following morning the patient was acutely ill; the gums were swollen and bleeding and the mouth had an odor encountered in acute leukaemia from superficial ulceration.

A diagnosis of agranulocytic angina was made on the basis of the blood count. The patient was given seven injections, intravenously, of 0.7 mg. of pentose nucleotide K96 for seven consecutive days. After the first injection, the temperature dropped, the patient felt better and the blood count improved. After the injections, some severe reactions occurred, such as precordial pain and dyspnea. The patient was able to go home from the hospital at the end of three weeks and remains in good health. The latest blood count showed a leukocytosis and a mild secondary anemia improving with iron medication.

This was the first case recorded in England in which pentose nucleotide was used in the treatment of agranulocytic angina.

Empy and Proescher in the *American Journal of Diseases of Children,* 1932, write of agranulocytic angina as a disease symptomatized by three distinct phases: (1) bone marrow changes; (2) blood changes; (3) the clinical picture.

They also say:

The underlying cause is a primary weakness of the bone marrow. Observations of repeated attacks of the same disease in the same patient may be due to constant presence of a specific attenuated infection (caries of teeth), and treatment of a chronic infection of the gums was the only thing that seemed to cause improvement.

Following is the report of a case which presented to me the opportunity to study the manifestations of the disease in actuality.

REPORT OF CASE

A white woman, an American, aged 44, well developed and apparently well nourished, and by occupation a trained nurse in charge of a convalescent home, gave a past history essentially negative, except for the last two years, when she had been treated osteopathically for an arthritic spine which had given her considerable trouble during the time mentioned.

The patient was requested, by her osteopathic physician, to have her mouth roentgenographed and examined by her local dentist, in order to eliminate, if possible, any oral focus of infection, as all other possible foci were apparently negative.

Feb. 3, 1933, in accordance with the suggestion of her osteopathic physician, the patient presented herself at the office of her local dentist. The findings, as related to me by this dentist, were as follows: All teeth, when examined roentgenographically, were found negative with the exception of two molars and one upper right bicuspid, which were devitalized and showed small pathologic areas at their apices. The three teeth in question were removed the same day under nitrous oxid-oxygen anesthesia. The time of operation was about three minutes. The dentist fur-

ther informed me that the patient left his office about twenty minutes after the operation apparently in good condition physically and mentally. The dentist did not see the patient again.

February 8, I was called to the patient's home by her osteopathic physician to examine her mouth, which had been recognized by him, and complained of by the patient, as being extremely sore and painful. The patient at that time had a temperature of 102.5. On examination of the patient's mouth, I found the upper right molar region acutely inflamed and swollen, especially in the region of the posterior palatine foramina, being suggestive of an acute postoperative infection. The alveolar process in this region had marked ragged edges. The soft palate was swollen and extended into the pharynx. The uvula was inflamed and edematous. The tonsils were inflamed also, but not abnormally so. Externally, there was swelling under the right orbit. The zygomatic and frontal bones were sore and painful to the touch. There was also a noticeable swelling in the submandibular region suggestive of a Ludwig's angina.

The sternocleidomastoid muscle on the right side was a trigger area of soreness and the patient could not stand palpation of this region. The condition was suggestive of symptomatic torticollis. The patient, when seen again, February 9, seemed to be resting more comfortably and appeared to be more cheerful than on the previous day. The mouth lesions had subsided, but the throat lesions had become more diphtheroid and the uvula was swollen to about the size of a large grape; which made breathing difficult. On further consultation with her physician, the services of a rhinologist were invoked. The patient became progressively worse and was apparently beyond medical aid. She died on the morning of February 11. Blood tests made at 5 p. m. on the previous evening showed the white cells to number 2,300, with a complete absence of granulocytes. Lymphocytes were the only white cells seen. Another count, taken one hour before death, showed the white cells to be 1,358, a progressive decline with the usual absence of granulocytes, and the red count at 4,640,000 little affected. The conclusions to be drawn from this particular case, in view of the complexity of the symptomatic syndrome, were that a series of diagnoses could be made and each one of them would be justifiable; for example, acute osteomyelitis, a streptococcic cellulitis with an acute Vincent's infection of the throat or a Ludwig's angina; but not until the blood count was made could a positive diagnosis be possible. What the etiologic factors in the sudden onset of this disease are is problematic. Was the extraction of the teeth under nitrous oxide anesthesia the precipitating agent for the onset? or were the chronic abscessed teeth, over a period of time, also a contributing factor? or, possibly, the arthritic spine? or a combination of all three?

The patient was not hospitalized, but had a trained nurse in constant attendance. Everything was done for her that could have been, from a medical point of view, under the circumstances. I believe that any therapeutic measures that might have been instituted would have been of little avail in this particular case, in view of the fulminating and prostrating nature of the malady, with its rapid and fatal termination. The picture in this particular case seemed a true copy of the original as first painted by Schultz, in 1922. According to the earlier medical customs, the disease would be known as Schultz disease; which, of course, is not considered today.

CONCLUSIONS

The mouth lesions, which seem to play so important a rôle in the diseases already mentioned and discussed, especially agranulocytic angina, must, I am sure, hold the same interest and concern for the doctor of dentistry as for the doctor of medicine. And, if that is true, the future training of students in dentistry must embrace the same fundamentals in theory and contact as are now required of the students of medicine.

The theory of pathology, as taught in

our classrooms and laboratories, is, I believe, thorough enough to meet our needs. But too much emphasis is placed on the imaginative ability of the student body to correlate these factors, except for the avowed purpose of passing the required final examinations on the subject. But after that period is over, the theory, as taught, becomes quite transitory. If the same theory, or at least some of the major pathologic lesions that are discussed in the classrooms could be visualized and rediscussed at the hospital ward or bedside, then, and only then, could the impressions be made lasting.

If we are to continue to concern ourselves with the problem of raising our standard of requirements in the study of disease and its prevention, the hospital ward and classrooms, if not annexed, must at least hold some semblance of teaching balance between them, somewhat similar to that which is now required by the medical school of the medical student.

The thought expressed in the preceding words was one of the chief topics of discussion at a recent meeting of the Association for the Advancement of University Education in Dentistry, held in Buffalo, under the title, "The Hospital as a Necessary Adjunct to Dental Education," eliciting very favorable comment from the educators attending. There are now four dental schools, affiliated with this association, that require hospital ward observation and instruction in pathology of the undergraduate body as a part of the requirements for graduation. The example set by these dental schools must be gratifying and should be hailed by every progressive mind in the profession of medicine and dentistry as a distinct advancement in the method of teaching. No doubt, the practice will soon become more general, ultimately being adopted by all dental schools.

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AN EFFECTIVE APPLICATION OF MECHANICS IN THREE-QUARTER CROWN CONSTRUCTION: A NEW PRINCIPLE AND ITS TECHNIC

By WALTER E. JONES, D.D.S., St. Paul, Minn.

IN my study and observation of the prevailing methods used in the construction of the three-quarter crowns of today, I have reached the conclusion that too much attention has been given to esthetics, and too little attention to the forces of mastication, their direction and their effects; nor has any specific provision been made to definitely resist these forces.

In the literature, there has been no mention of the stresses that the three-quarter crown has to withstand except for the general term, "the stress of mastication." The physics of the forces of mastication, as it applies to the three-quarter crown, has not been recognized; or, if so, has been ignored. There has been nothing said about the direction of these forces or any intelligent application of the fundamental principles of mechanics in the control of these forces.

The mechanics involved in the three-quarter crown deal with normal forces, shearing stresses, wedges, leverages and inclined planes, and their relations and control.

The stress which is primarily exerted on the bearing surface of the three-quarter crown on the anterior teeth is a shearing stress, beginning on the incisal edge and passing on an inclined plane toward the gingival aspect, and associated with a stress normal (perpendicular) to the tooth surface. Initially, in the act of incising, the stress is on the incisal edge. It is primarily axial (Fig. 1, left), but develops quickly into a shearing stress accompanied by a stress normal to the surface, passing toward the gingival aspect, labially on the lower teeth and lingually on the upper teeth. The shearing stress tends to move the metal over the supporting tooth in this area as shown by the arrows *a* and *a'* in Figure 1, right.

In the process of chewing, there is very little or no stress on the anterior teeth, as we have clearance here for the lateral movements of the mandible. On examining anterior teeth, it is found that the markings from wear are not at right angles to the long axis of the tooth, but from the incisal edge toward the gingival aspect, on the upper teeth usually covering the incisal third of the lingual surface, and therefore giving evidence of the existence of the above-mentioned shearing action. As this shearing stress is away from the incisal edge, it is desirable that the retention be at the incisal edge.

There is also a rotating stress that the three-quarter crown must withstand.

This stress is less in the case of a restoration and more when the crown is used as an abutment. This rotating stress can be withstood best by the tooth and crown when the crown has the greatest diameter of the tooth within its grasp.

In addition to its use in restoring a lost portion of a tooth, the three-quarter crown is used as an attachment or abutment for bridgework. In this capacity, it is necessary to have an attachment that grasps the tooth with all the rigidity possible, so that it will not be dislodged by the forces of mastication. This must be

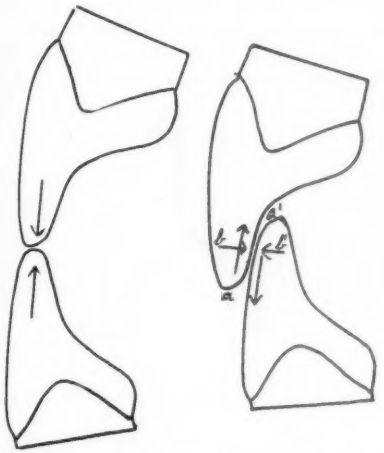


Fig. 1.—Left: Direction of stresses in initial act of incising. Right: Direction of stresses during remaining act of incising. *a* and *a'*, shearing stresses; *b* and *b'*, normal stresses.

accomplished by so shaping the tooth that the crown grasps it in such a manner that the structural relationship will take care of all the stresses that the tooth will be called on to resist. In other words, when the crown is in place, it should so mechanically grasp the tooth that the cement does nothing but act as a seal by filling the space remaining between the crown and the tooth. We have very good cements, it is true, but it is asking too much of a cement to expect it to hold a bridge abutment that is poorly engineered.

Before going into the structural aspect of this preparation, the following must be taken into consideration.

1. The periphery of the crown should be in self-cleansing or immune areas, the fundamental requirement according to Dr. Black's rules of cavity preparation.
2. The loss of tooth structure should be kept at a minimum.
3. The life of the dental pulp should not be endangered either during the preparation of the tooth or as a result of that preparation.
4. The preparation should be as painless as possible, and should not require the use of an anesthetic.

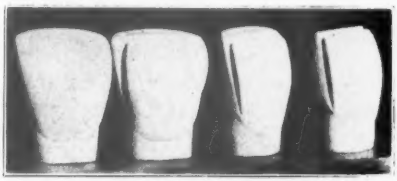


Fig. 2.—Stages of preparation.

5. The technic should be simple and easy, requiring no special equipment or instruments, etc.
6. Preparation of the tooth should be such as to make cementation successful.
7. As little gold should be shown as is consistent with good construction.
8. The appliance should be suitable for all types of teeth, either upper or lower, anterior or posterior, regardless of the intermaxillary relationship.

In order to design a successful three-quarter crown, a thorough knowledge and understanding of the principles of mechanics involved and an intelligent application of these principles to the problems at hand are essential.

The mechanical side of the question should take the following into consideration:

1. The tooth should be grasped at the initial point of stress.

2. Levers either should be eliminated or their effects controlled, that is, the distance between the point of stress and the point of resistance, should be kept to a minimum.

3. The preparation should take into consideration the utilization of all the tooth structure possible and should not weaken the tooth, especially on the incisal edge. As the incisal edge is the point of initial stress and the beginning of the shearing stress, it is essential that there be a definite support at that point.

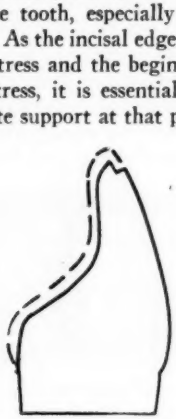


Fig. 3.—Cross-section of incisal step.

4. The walls of the grooves should be parallel to the enamel rods and not leave any weakened or unsupported tooth structure.

5. The grooves should be angular rather than round and should taper at the end to minimize the loss of tooth structure and to assume better and easier adaptation.

6. The walls should be kept parallel if possible, to reduce the wedging effect and increase frictional wall retention.

7. The preparation should meet the requirements of cementation.

8. The wedging effect of the inclined planes should be definitely controlled.

9. By an intelligent application of the laws of physics, the tooth should be so shaped that when the crown is made and cemented to the tooth, this unit will withstand the forces of mastication. In other words, in order to construct a good three-quarter crown, the forces of mastication must be considered, their direction and their effects not only on the crown itself, but also on the relationship between the tooth and the crown. The tooth, therefore, must be prepared so that positive provision is made to control definitely the effects of the forces of mastication on the relationship between the crown and its supporting tooth.

This can be accomplished by the following technic: (Fig. 2.)

Fig. 4.—Cross-section of incisal retention.

1. Before any tooth structure is removed from the incisal edge, a carborundum disk is used to cut on the labial surface, parallel to the incisal edge and 1 mm. therefrom, a groove the walls of which are parallel to the enamel rods in that area, to the depth of 0.5 mm. The operator, holding the disk at right angles to the long axis of the tooth, removes 0.5 mm. from the incisal edge. This is for clearance. Then with a disk held parallel to the labial surface, he removes that portion of tooth structure between the groove and the incisal edge, forming a step the incisal portion of which should be slightly rounded. This means that the

restoration here will show approximately 1 mm. of gold, which can be greatly improved esthetically by rounding the incisal edge labiolingually. Occasionally, owing to the proximity of the adjacent tooth, it may be found difficult to cut this groove to the mesial or distal angle with a carborundum disk. A small knife-edge stone or knife-edge bur can be used. There are times when a small inverted cone stone or an inverted cone bur will be found very useful in these areas.

2. On the mesial surface, with a safe sided carborundum disk held at a 45 degree angle to this surface, parallel to the enamel rods in this area, the operator cuts a groove from the mesiolabiogingival angle toward the incisal edge so that the distal

Fig. 5.—Cross-section of incisal step in other types of preparations.

edge of this groove will become the mesiolabial angle after the bell of the tooth is removed. The depth of this groove should be 0.5 mm. at the incisal end and, owing to the curvature of the labial surface of the tooth, should fade out at the gingival end. This is repeated on the distal surface, the groove running from the distolabiogingival angle toward the incisal edge so the mesial edge of the groove becomes the distolabial angle after the bell of the tooth is removed. The depth of the groove should be 0.5 mm. at the incisal aspect and, owing to the curvature of the labial surface, should fade out at the gingival aspect. The mesial and distal grooves should be parallel or slightly converging toward the incisal aspect.

3. The bell of the tooth is removed on the mesial and distal aspects, these surfaces becoming parallel or slightly converging toward the incisal aspect. The method and means of removing the bell is a matter of choice. The pushing of a toothpick between the proximating teeth at the gingival aspect will slightly spread them. This facilitates removing the contact point with a safe-sided carborundum disk. This disk or a very stiff coarse sandpaper disk can be used to remove the remaining bell, care being taken to keep straight with no undercuts. To reach and remove the bell from the area of the mesiolinguogingival and distolinguogingival angles, a coarse sandpaper disk is used, one that can be bent or forced to this area. When the bell is removed, this will leave a groove directly lingually of the mesiolabial angle and the distolabial angle. As stated above, the groove should be 0.5 mm. deep at the incisal aspect and fade out at the gingival aspect.

4. Stones are used to remove enough of the tooth structure on the lingual surface to allow for clearance of the bite and sufficient thickness of metal. The lingual portion of the incisal edge should be rounded or slightly flattened.

Owing to the ease of making and paralleling the grooves, I favor the above-described procedure, although the grooves can be made after the bell of the tooth has been removed from the mesial and distal surfaces, as follows:

A groove is made on the mesial surface by holding a carborundum disk at a 45 degree angle to this surface, parallel to the enamel rods, joining the lingual wall of the incisal step with the mesiolabiogingival angle, and sinking the disk directly lingually of the mesiolabial angle.

The groove should be 0.5 mm. deep at the incisal aspect, and, owing to the curvature of the labial surface, should fade out at the gingival end. This operation is repeated on the distal surface, the grooves being kept parallel or slightly converging toward the incisal.

If the grooves are started a little laterally, that is, nearer the mesial or distal aspect, they can be paralleled and, when once paralleled, they can be moved medially to the proper position. This gives the operator an opportunity to parallel not only the grooves in each individual tooth, but also these grooves with the grooves on the other teeth that are to be used for abutments, before any groove is put in its final position. In other words, all grooves can and should be paralleled before any other tooth structure is removed, and starting them in tooth structure that has to be removed eventually gives ample opportunity to make changes before putting them in their final position.

This principle of construction can be used in the same way on posterior teeth, the retention being kept at the periphery of the prepared tooth. The buccal surface is treated the same as the labial surface of an anterior tooth. Consequently, a step will be formed at the bucco-occlusal angle, which, after clearance has been provided for, will be 0.5 mm. by 0.5 mm. The gingival portion of this step should be parallel to the enamel rods. The mesial and distal grooves are cut the same as in anterior teeth. That is, on the mesial surface with a safe-sided carborundum disk held at a 45 degree angle to this surface, parallel to the enamel rods in this area, a groove is cut from the mesiobuccogingival angle toward the occlusal aspect so that the distal edge of this groove will become the mesiobuccal angle after the bell is removed; etc.

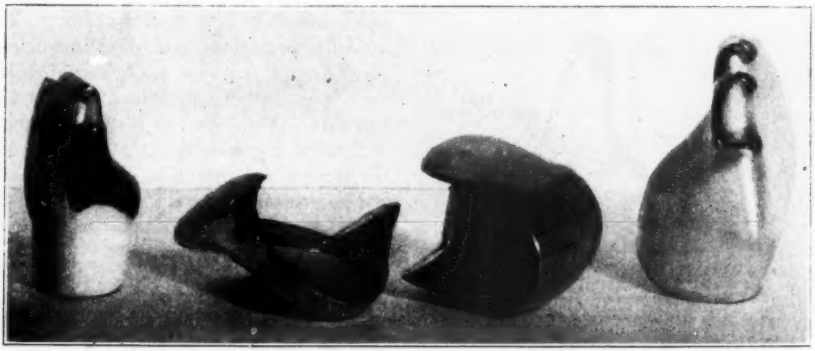


Fig. 6.—Left to right: Crown with corner removed to show mechanics of retention; inside views of casting for central incisor and bicuspid respectively; cut-out section of crown showing mechanics of retention.

This preparation has proved very satisfactory for more than twelve years. Crowns and abutments made of 22-carat gold have stood the test of time, but if the harder golds are used, the crown or the abutment will be less conspicuous, owing to their lighter color. Because of their hardness and strength, the harder golds are undoubtedly indicated in some cases.

The principles of this preparation can be used to a decided advantage when a

young patient has broken off a corner of an anterior tooth, the pulp being nearly exposed. The position and depth of the grooves make it possible to make a three-quarter crown with the removal of very little tooth structure, just enough for clearance of the bite and bell, without further pulp irritation.

This also can be used in large cavities on the mesial and distal aspect of an anterior tooth, if the pulp is vital, and the patient either too young for a porcelain jacket or unable to afford one. It is suggested that the cavities be cleaned out and filled with cement, filling undercuts and leaving no bell. As a groove in cement is of no value, it may be necessary to make the grooves farther toward the labial aspect and perhaps even on the labial surface, keeping the grooves parallel to the enamel rods in the area in which the groove is placed. The incisal groove should be made as described above. We grant that this means the showing of a large amount of gold, but should a patient have to lose a tooth because he cannot afford a porcelain jacket crown and our restoration does not come up to our ideal of æsthetics?

If the bite is to be opened, the anterior teeth are generally very thin, but the pulps are alive. This preparation can be used to decided advantage in building up these teeth, since, owing to the position and depth of the grooves, it does not weaken the remaining tooth structure or interfere with the pulp.

The underlying principle of this preparation is to utilize all the available tooth structure possible by having the retention at the periphery of the prepared tooth, so that the crown grasps the tooth labially to the contact points and on the incisal edge, protecting the tooth instead of weakening it in this area, and thereby making specific provision to control definitely the effect of the forces of mastication.

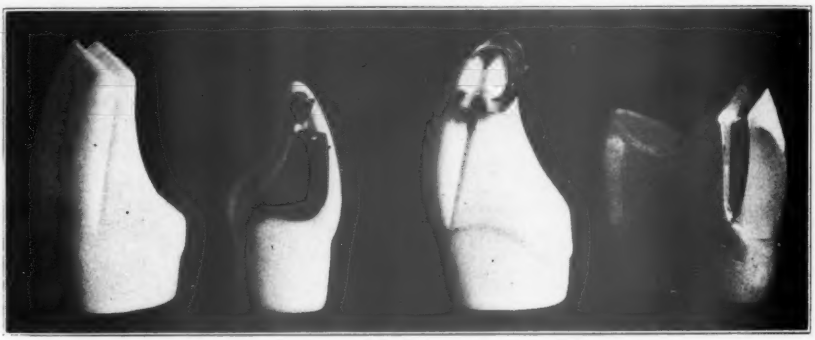


Fig. 7.—Left to right: Model showing position of grooves; crown with corner removed to show ineffective retention in prevailing type of three-quarter crown; cut-out section of crown, showing effectiveness of retention; preparation for bicuspid.

The removal of any tooth structure from the lingual surface for the purpose of retention is a waste of good tooth structure and shows an utter disregard of the principles of mechanics. The strength of a preparation is not gained by the size or depth of a groove, but by its position and the amount and strength of the tooth structure behind that groove.

If the fundamental principles of den-

tistry are adhered to, it is necessary to show a slight amount of gold on the mesial and distal aspect, varying in amount with the bell and shape of the tooth. This preparation shows a little more gold on the incisal edge than is desired for esthetic considerations, but having been used for over twelve years, it has proved its merits.

When the majority of people arrive at the point where it is necessary to replace anterior teeth with bridgework, they are more concerned with the ultimate results and its longevity than they are with esthetics. When a patient comes in with a bridge loose and the abutments decayed away and says that the work was done

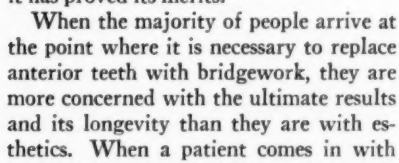


Fig. 8.—Two views of grooves.

a couple of years ago, it is very hard indeed to console him by saying that it is a beautiful piece of work. They soon forget the beauty, but they always remember the dentist's name and how long the work lasted.

The few to whom esthetics means everything do not object and can afford to have their work replaced at frequent intervals. Should the majority have to suffer for the whims of the few?

The principles in this preparation are applicable to all types of teeth, thick or thin, long or short, upper or lower, anterior or posterior, regardless of the bite, and especially applicable to thin anterior teeth, but I deem it most fair and instructive to use models and drawings of average measurements. Models and drawings made out of proportion show a disregard for dental anatomy. All models used by me are made according to the measurements of the average, from the "table of measurements of the teeth of man, given in millimeters and tenths of millimeters," found in Black's "Dental Anatomy." The models here illustrated are either carved out of marble or are metal castings made to scale. The larger models are seven times the average and the smaller five times. As there are no measurements

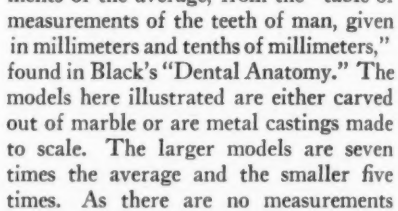


Fig. 9.—Left: New type of preparation. Right: Old type of preparation.

given for the curvatures, except the curvature of the gingival line, the amount of the other curvatures is a matter of opinion.

Referring to the technic for the preparation of the incisal edge, it will be recalled that a step, as in Figure 3, was formed by cutting parallel to the incisal edge, and 1 mm. therefrom, a groove the walls of which are parallel to the enamel rods in this area, to the depth of 0.5 mm.; etc. Then 0.5 mm. was removed for clearance, a step 0.5 mm. by 0.5 mm. remain-

ing. As this area of the tooth is easily accessible and not sensitive, it is possible to make a definite step which, owing to its positiveness and position, has real mechanical value. A step of smaller proportions would not be very definite and to make it larger is unnecessary. At least 0.5 mm. should be allowed for the thickness of metal on the incisal edge and the lingual surface.

A cross-section through the median line of the tooth and crown, as in Figure 4, shows the crown with a hooklike retention over the incisal edge. It will be noted that the tooth is not weakened in this area, but forms a definite support for the crown, which in turn protects the incisal edge of the tooth. It will also be noted that the distance between the point of stress and the resistance is just a thickness of metal, and therefore there are no leverages, and that the frictional stress is definitely taken care of at its source. That portion of the crown that covers the incisal edge is tubular and thus does not readily lend itself to bending. It therefore plays an important part in preventing the crown from opening at the gingival aspect.

If the wedging effect of the supporting tooth accompanied by the frictional pressures on the incisal third of the lingual surface is not definitely controlled, the crown will have a tendency to open at the gingival aspect. Those who do not appreciate the mechanics involved in the construction of the three-quarter crown blame the golds for this, when it is really due to the preparation. Some operators, in an effort to overcome this action, increase the amount of gold at the gingival aspect, but as the forces that have this undesirable result begin at the incisal aspect, that is the logical place to effect control.

The cement in a three-quarter crown should act as a seal and be subjected to compression forces only. It should not be subjected to shearing stresses or rotating stresses, and therefore this preparation and the construction of a crown to take care of these forces mechanically facilitate successful cementation. It will also be noted that the grooves of the prepared tooth form sharp angles or corners near the periphery of the surfaces to be cemented which tend to prevent cleavage. When the direction of a force is changed, it loses its effectiveness, and therefore surfaces with definite irregularities or sharp changes of direction such as corners just within their periphery lend themselves to more effective cementation than do long and uninterrupted surfaces.

Figure 5 shows a cross-section through the median line of one of the prevailing types of three-quarter crowns on an upper central incisor. It can readily be seen that the incisal step has weakened that portion of the incisal edge that remains, and has added little in the way of retention. It does make it possible to increase the thickness of metal which gives the crown some rigidity in this area, but at the expense of valuable tooth structure. It is inadvisable to remove tooth structure that has mechanical or retentive value, and equally so to remove tooth structure if its removal leaves the remaining tooth weakened. In many cases, the remaining tooth is so thin and translucent that when the crown is cemented to place, there is a darkened area in this vicinity. When no step is used at all, a greater respect for tooth structure is shown, but the importance of controlling the devastating effects of the forces of mastication is not recognized.

As the periphery of the crown must be in self-cleansing areas, it is necessary to extend the preparation labially to the contact points. Therefore, if the grooves are placed at the periphery, the greatest diameter of the tooth will be within the

grasp of the crown. This is very essential in obtaining control of the rotating forces, and in preventing the disastrous effects of these forces on the relationship between the crown and the tooth.

Owing to the tremendous power of the wedge, it is folly to use it for retention when its primary action is one of cleavage. The effects of the wedge formed by the grooves and the inclined plane of the lingual surface are definitely controlled by the hooklike retention on the incisal edge. The mesial and distal tongues, the metal which fits in the mesial and distal grooves, are a continuation of the incisal hook and prevent the latter from straightening out. Therefore, the wedging effects in this preparation have been taken care of by specific provisions.

The cutting of these grooves is practically painless, owing to their position and depth, and does not in any way jeopardize the dental pulp. It is not necessary to employ an anesthetic or to protect the prepared tooth between sittings.

The grooves are angular, there being less loss of tooth structure than if they were round. The accessibility of the grooves facilitates the making of wax patterns direct.

As regards the mesial and distal grooves in other types of crowns, some operators make them with a tapering bur, allowing them to fade out at the gingival end; while others use cross-cut fissure burs and make the grooves the depth of the bur at the gingival aspect. If the cross-cut fissure bur is used, resistance is increased at the gingival end, but it is too far from the point of shearing stress to be effective. This is also true of placing a pit or pin at the cingulum, the leverage being so great that it has little mechanical value.

The incisal ends of these grooves terminate on the lingual surface, forming wedges, with no provision to control their action. Furthermore, the points of the wedges, the v-shaped pieces of tooth formed by the grooves and the lingual surface, are, owing to the ineffectiveness or absence of the lingual step, the points that must bear the force of the frictional strain. These grooves are round, a greater loss of tooth structure with less retention resulting than if they were angular. They are put in after the bell is removed and of course are near the horns of the pulp. Many operators find it necessary to use an anesthetic in order to place the grooves. Their proximity to the pulp many times causes disagreeable thermal reactions, with occasional subsequent death of the pulp. Owing to the loss of tooth structure, it is necessary to protect the tooth between sittings.

The same principles of mechanics are applicable to the posterior teeth as to the anterior. It seems that, in the past, there has been no cognizance of the medial-lateral forces, and therefore no provision has been made in the preparation to withstand their action. The stress on the posterior teeth is not only an occusal-rootwise stress, but also a frictional stress on the occlusal surface as the teeth pass buccolingually over each other in the process of chewing. The later stress is the one that spells failure if it is not definitely taken into consideration when the engineering of the preparation is made. The lateral stress on the posterior teeth, either upper or lower, is amply taken care of by the lingual surface. The medial stress on the posterior teeth, either upper or lower has its beginning in the vicinity of the buccoclusal angle, and it is there that this stress can be positively controlled. By the construction of a step, the buccal surface being treated as if it were the labial surface of an anterior tooth, at the buccoclusal angle. As this area is easily accessible and not sensitive, a well-defined step can be cut and, owing to its position, have real retentive value.

This brings the periphery of the crown into self-cleansing areas with no chance of cleavage, protects the cusps and affords a bulk of material to finish with and a form that is favorable for cementation.

As regards the mesial and distal grooves, as the gold must come far enough toward the buccal aspect to be in a self-cleansing area, this is the place for the groove, just lingually to the mesiobuccal and distobuccal line angle that is formed when the bell has been removed.

Why put the grooves on the occlusal surface between the cusps and continue them over on the mesial and distal aspects and thereby grasp only the lingual cusp, which is the smaller of the two and must be reduced for clearance and bell, when the gold must extend to the buccal aspect, into immune areas? Why not take all this additional tooth into the grasp? By grasping the tooth buccally to the contact points, the crown has the greatest diameter of the tooth within its grasp, thereby controlling the effects of the rotating forces.

It has been pointed out that this preparation does not follow Black's rules of cavity preparation in that the grooves do not end in dentin. This may be true, but it has no significance. Black's cavity preparation deals with the preparation of a tooth to hold the filling material; that is, the shape of the cavity must meet the requirements of the mechanics involved from the standpoint of both the tooth and the filling. In the preparation of a three-quarter crown, the reverse is true; that is, the tooth must be prepared in such manner that the crown can grasp the tooth, all the principles of mechanics possible being made use of.

Deeming it advisable to secure technical advice in regard to the principles of mechanics involved in this article, I consulted an authority on physics, taking special pains to have each point checked.

Certain of the advantages of this preparation are as follows:

1. As the preparation is practically painless, no anesthetic is needed; nor does the tooth require protection between sittings.
2. There is no pulp irritation either during or following the preparation.
3. There is the minimum amount of tooth destruction consistent with maximum strength and extension for prevention.
4. The preparation does not leave weakened or unsupported enamel.
5. The incisal edge of the tooth is not weakened by the preparation, but is well protected by the crown.
6. Positive provisions have been made that the tooth and the crown shall withstand the forces of mastication.
7. The procedure is suitable for all types of teeth, and is especially adapted to thin teeth and lower anterior teeth.
8. The technic is simple.
9. Successful cementation is facilitated.

As was mentioned above, the only objection to this restoration is that a little more gold shows on the incisal edge than is desired, but when we consider the sad effects of a few years of service on crowns where a little or no gold is exposed, the added strength and security seems worthy of whatever sacrifice there is involved of esthetic values.

WHY FILLINGS FAIL*

By RALPH R. BYRNES, D.D.S., F.A.C.D., Atlanta, Ga.

OBVIOUSLY, there are innumerable reasons why fillings fail. All of these reasons can be grouped under (1) inadequate cavity preparation; (2) the selection of unsatisfactory filling materials, and (3) improper manipulation of filling materials.

In justice to the dentist, it must be admitted that he is not always entirely to blame for failures, since the variability of certain dental materials is sometimes a factor over which he has little control. This will be discussed later in this paper.

I wish to repeat that the majority of failures of dental restorations are due to some deficiency in the dentist's technic.

These three reasons for failures, in turn, embrace a number of things which I do not have the time to discuss fully in this paper. For instance, improper cavity preparation may be traced to carelessness on the part of the dentist, or it may be attributable to the dentist's lack of knowledge of tooth structure, both anatomic and histologic. One could not expect a dentist who does not know the general direction of the enamel rods in various parts of the tooth to know how to bevel angles of cavities, or where to lay walls of cavities. Likewise, one could not expect him to know how deep to lay the base of a cavity if he does not know the relative depths of the enamel and dentin in various portions of the tooth. Inadequate cavity preparation also may be due to poor operating equipment, or, if the operating equipment is efficient, it may be due to an improper use of the equipment.

The selection of unsatisfactory filling materials may likewise have a number of factors. For instance, the selection of an inadequate filling material may be laid to carelessness, lack of knowledge or deference to the whims of the patient. His failure in this respect may even be traced to an inapplication to chemistry and physics courses of elementary grade, or to a total absence of such courses. Again, it may be attributed to the dentist's neglecting to read the current periodicals of his profession.

The third general reason for failures of fillings, namely, "improper manipulation," may have a number of minor causes.

GOLD FOIL

Where indicated, gold foil is the most nearly perfect filling material in existence, and at once the most neglected. The failure of gold foil fillings rests entirely with the dentist. There is less "variability" about gold foil than any other filling material. We know, or should know, what gold foil will do under certain circumstances. We do not have the factors of expansion and contraction to deal with as we do in inlays and amalgams. We get a far better standardized product from the dental manufacturers than in the case of other filling materials. If you would determine a dentist's real worth, judge him by his

*Read before the Indianapolis Dental Society, April 9, 1934.

gold foil fillings. Here, he will find no convenient excuses upon which to fall back. The personal element enters more into gold foil work than it does into any other form of operative procedure. In fact, the worth or worthlessness of a gold foil filling is due entirely to the ability or inability of the dentist himself. Let us look for a moment at the excellences of foil as a filling material. The textbooks list ten of them. They are:

1. Cohesiveness. Gold is superior to any other metal in this respect. This quality depends largely on purity. The best golds are about 999 parts in 1,000 pure gold.

2. Softness during manipulation. This quality depends also largely on purity.

3. Malleability. Gold exceeds all other metals in this quality. It may be reduced by beating to one two hundred fifty thousandth inch in thickness. Reamur is said to have produced a sheet 0.00000087 inch thick.

4. Ductility. It is the most ductile metal. One grain of pure gold may be drawn into a wire nearly 500 feet long.

5. Hardness in bulk form. Gold is about one-third as hard as the diamond. This property is largely increased by alloying and by hammering or rolling. Its "Brinnell" hardness is given as 48.0 in comparison with copper, 74.0, and silver, 59.0. Tested on a Shore schleroscope, the following values were determined by Ward, for 24-karat gold: cast gold, 4.9; rolled gold, 33.0; annealed after rolling, 5.8.

6. Tensile strength. Gold can support a weight of 7 tons per square inch, according to Hiorns.

7. Weldability in the cold state. Most other metals must be heated for welding.

8. Minimum tendency to flow.

9. Coefficient of expansion. In gold, this is 14.4 per cent, approximating 11.4 per cent, the coefficient of expansion of the crown of a tooth.

10. Thermal and electric conductivity. In gold, this is 53.20 and 77.96, respectively, as compared with the thermal conductivity of copper (73.60) and silver (100), and the electric conductivity of copper (99.95) and silver (100).

Notwithstanding the perfection of gold foil as a filling material, there are certain conditions under which it should not be inserted. The discriminating dentist will remember these. For instance, gold foil is contraindicated in the teeth of very young or very old persons; in the very young, because the peridental membrane is thicker and offers more counter-resistance to the process of malleting, thus affecting the condensation. Gold foil should never be placed in young teeth with undeveloped roots, as the malleting may produce inflammation of the pulp and of the peridental membrane. Old persons and convalescents are particularly liable to be intolerant of the malleting, with the result that the dentist is likely not to condense the filling as thoroughly as he should. The outcome of this would be a leaky and pitted filling.

Gold foil should not be put into extensive cavities with weakened walls, for obvious reasons. Splitting of the crown may result, either during the malleting, or later, during the masticatory movements of the patient's jaw.

Granting that the filling is indicated, let us look at some of the common faults of operators which may cause failures.

1. Malleting. Either too much force or too little force is used in malleting the gold. If too much is used, the serrations on the plugger points will sink deeper than necessary and choppiness or unevenness result; if too little, condensation of the foil will be inadequate, a soft filling resulting.

2. Angle of force. One of the most common mistakes is to direct the force of the plugger at right angles or perpendicular to the plane of the cavity. This should never be done. Wherever possible, the angle of force should be inclined about 10 to 12 degrees from the perpen-

dicular to the plane of the wall of the cavity against which force is being directed. The reason for this will be obvious to any one who will lay a piece of gold plate on a flat surface, such as an anvil, and hammer it with an instrument held at right angles to it. The gold will curl away from the instrument.

3. Wedging the gold. This is the most important procedure of all. Gold always should be wedged between angled walls of a cavity and not directly against a flat surface. It is a well known fact that the dentin has a considerable degree of elasticity, approximately that of a billiard ball. Gold also has elasticity, and if these facts are borne in mind, the angles of the cavity will be put to good use as aids in wedging. One of the most frequent errors of manipulation is incurred in the filling of small, simple cavities with gold foil. Here, the operator is most likely to start his filling by covering the entire floor of the cavity with foil, working toward the walls. This is entirely wrong, as illustrated by the experiment cited above. Even in the smallest cavities, the gold first should be built along a line angle. Adaptation of gold is gained by utilizing the elastic qualities of the dentin. Of course, such adaptation is more easily taken advantage of in the angular portions of the cavity.

4. Stepping the plugger. Many operators make the mistake of moving the plugger point from place to place while malleting the gold in the cavity. The plugger point should not be moved or "stepped" more than a distance of three-fourths its diameter. If this rule is adhered to, the successive blows of the plugger will overlap one another, resulting in much better condensation. We must remember at all times that condensation in gold foil work is of major importance. Large "hunks" of gold should not be placed in a cavity. Instead, small pieces should be condensed one at a time. After a foil filling is completed, it is too late to try to correct condensation in the body of the filling.

5. Contouring. This is extremely important in gold foil work and is one of the most difficult requirements to meet in this class of operation. The operator should always have a surplus of gold at points where contouring is necessary; as for instance, the groove portions, the cusps and the contact points. If this is not done, he may be compelled to add more gold after the filling is completed. This method is unsatisfactory, since gold added later at such points often flakes or chips off. It is just as necessary to have proper contours in a gold foil filling as in an inlay or amalgam filling. In building a contact point on a foil filling, it is well to tighten the separator immediately before, in order to be certain that none of the contact points may be lost in subsequent finishing and polishing.

6. Cavity preparation. Another common reason for failures of foil fillings is the dentist's neglect to bevel properly the cavosurface angles of his cavities. Of course, it should be remembered at all times that the bevel should be in line with the direction of the enamel rods, in order that no short rods may be left unsupported, to break down under the stress of malleting, or, later, under the force of mastication. Particularly is it important that no such weak margins be left in a gold foil preparation, since the margins will have to meet unusual stress in the malleting of the gold to place. If the enamel walls break down after the filling is completed, there will, of course, be no cement to compensate partially for this fault, as in the case of the inlay. Here is an instance of the value of dental histology to the dentist. The inclination of the enamel rods varies in certain portions of the tooth. Generally, the rods are

perpendicular to the dentin-enamel junction and to the surfaces of the teeth. The dentist should know where they deviate therefrom.

In gingival third cavities, failure of foil fillings frequently results from improper beveling of the margins of the cavity, and particularly the gingival margins. The gingival enamel here is very thin, and unless it is properly beveled, the slightest blow from the plugger point will fracture it. Too often the dentist directs the plugger point at right angles to the floor of the cavity.

7. Condensation. In Class 1 (pit and fissure) cavities, provided the preparation is correct, lack of proper condensation and of proper wedging against the mesial wall constitutes the principal reason for failures.

In Class 3 cavities (in the proximal surfaces of incisors and cuspids and not requiring removal of the incisal angle), failures often result from imperfect condensation on the lingual margin, and especially at the linguogingival. This is accounted for by the fact that, in the insertion of the filling, the operator allows the foil to overlap and "get ahead" of him, with resulting imperfect adaptation of foil in that area.

In proximal fillings, probably the most vulnerable point is the gingival portion. So many dentists are content to leave an overhanging layer of gold there, although the greatest pains should be taken to finish the filling at that point. This should be accomplished with gold knives and bug-shaped files, to insure a flush margin at the gingiva.

8. Polishing. Another important thing often overlooked in gold foil fillings is proper polishing. Uneven surfaces of fillings will retard the excursion of food, make toothbrushing less effective, disease of the oral tissues resulting eventually.

AMALGAM

Failures of amalgam fillings are unusually common, and, in general, most of them may be attributed to carelessness or lack of knowledge, or both. Contrary to general acceptation, amalgam needs most careful handling. To construct amalgam fillings properly requires much skill. They are usually no better than the integrity and discernment of the operator inserting them. They require as much care in cavity preparation and manipulation as other types of fillings. In fact, the requirements of correct amalgam technic are so exacting that very few dentists have the moral courage to meet them. Consequently, one sees a hideous display of "sloppy" amalgams in the mouths of many patients everywhere.

If there is any man in the United States qualified to speak with authority on the amalgam filling it is William E. Harper, who has spent twenty-five years earnestly studying the properties of amalgam. According to Dr. Harper, most amalgams fail because of inadequate compression. It will be recalled that this was realized also by G. V. Black, who said, in effect, that the essential thing about successful amalgam work can be stated in the one word, "compression."

Dr. Harper has called our attention to the fact that amalgam fillings placed in gingival third cavities often bulge from the surface of the tooth, and I am sure that every dentist has noticed this common defect. Here, we have a very limited depth to the cavity, and the dentist finds himself in a dilemma. He must properly compress the amalgam if he is to make a satisfactory filling, and yet, in attempting to do this by the old technic, the amalgam becomes unstable, and moves at the opposite margin of the cavity. Consequently, the dentist chooses the lesser of the two evils, and leaves an excess of unexpressed mercury in the fill-

ing, which, when afterward exposed to the varying temperatures occasioned by eating and drinking, will cause the amalgam to "flow." Dr. Harper offers as a corrective his "burnishing technic," which differs materially from the usual amalgam technic, the amalgam being placed piece by piece, in small quantities, and each batch thoroughly burnished and condensed before more is added. This first amalgam should be inserted while it is in a decidedly plastic condition. Other additions are less and less plastic, progressing to the final application. Each piece is kneaded before insertion, then packed and burnished individually. Dr. Harper has designed several small burnishers for this purpose. He asserts that greater condensation is achieved by this method—a statement borne out by 105 test fillings.

According to this authority, proximoclusal amalgam fillings are often unsatisfactory, for several reasons. Chief of these is the fact that there are on the market no amalgam matrices which adhere snugly to the gingival portions of the tooth and which are sufficiently strong to withstand the force necessary in correct condensation with the proper instruments. As a result of this deficiency of matrices—for which the dentist is not responsible—the amalgam protrudes beyond the cavity wall, which makes it necessary to do much trimming, grinding, "disking" and "stripping" at the gingival portion of the filling. According to Dr. Harper, unless the force of compression is sufficient to cause a pressure 130 pounds to the square inch at all points, adaptation of the filling material will be imperfect, and the filling of doubtful value.

Another reason for failures in proximoclusal restorations lies in the fact that comparatively few dentists carve their amalgam fillings to anatomic correctness. Too little attention is given to the reproduction of planes and grooves, and to marginal ridges in particular.

My own observations of amalgam fillings reveal that many of them are imperfect at the occlusal and gingival margins. I am sure that this is a common observation with all of us. These margins, especially the occlusal, are rounded, with crevices between the filling material and the wall of the cavity. Because this condition is so common, it is generally believed that amalgam has no edge strength. Either the enamel margins of the cavities were not properly finished and beveled, or, what is more likely, the filling was never trimmed back to the true margin. Regardless of the exact cause, poor approximation of the amalgam and tooth structure results. Of course, any overhanging, thin edge of amalgam will break away during mastication.

The most essential point of difference in the preparation of cavities for amalgam and for foil lies in the beveling of the cavosurface angle. Dr. Black has taught us that, for foil, the cavosurface angle should be beveled from 6 to 10 degrees from the plane of the wall and that the bevel should include one-fourth the thickness of the enamel. The only difference in the establishing of the cavosurface angle for foil and for amalgam is that, for the latter, the bevel is made longer because amalgam has not the edge strength of gold, and, therefore, a greater bulk of the material is needed against the margin for strength. The bevel for amalgam should be much longer than for foil or for inlays. In fact, it may include all the enamel wall and, where the enamel is thin, may even include a portion of the dentin wall. Because amalgam has a more friable edge than foil, it was once thought that the cavosurface angle of the cavity should be finished as nearly straight as possible and without

any bevel. This is as fallacious as the old, discarded theory that as long as the base of the cavity is wider than the opening, the filling cannot be lost. We must insist on the beveling of the cavosurface angle for the protection of the enamel margin; for, unless it is beveled, the margin will contain numbers of unsupported enamel rods, which have almost no strength and which will crumble under the stress of mastication. This leaves a vulnerable spot or line for the probable recurrence of caries. Also, we bevel for the removal of the friable edge of the enamel. In other words, in any cavity, we bevel for two reasons: (1) to remove any unsupported enamel rods, and (2) to reduce the friability of the enamel margin. Having beveled the cavosurface angle of our cavity, let us not forget that the observance of the toilet of the cavity is an absolute essential for all types of fillings.

Unquestionably, the ideal condition for inserting all filling materials demands the use of the rubber dam, for any saliva allowed to dry on the wall of the cavity forms a coating which serves as a separating film between the filling material and the tooth structure.

THE GOLD INLAY

1. Inlays often fail because the dentist does not regularly make use of gingival margin trimmers. Failure to use these in cavities prepared for inlays will result in a sharpness of the enamel margins, which will then readily break off.

2. Inlays often fail on occlusal surfaces because the enamel wall is not properly beveled. The short enamel rods break off, an imperfect approximation of enamel and gold resulting.

3. Inlays fail because of improper or inadequate contact points, peridental disturbances resulting. Contact points are not soldered on when needed. The soldering of a contact point is a comparatively simple thing, but this phase of operative procedure often is neglected.

4. Inlays fail because the dentist usually is satisfied if he achieves only centric occlusion in a restoration. Frequently, no effort is made to balance the eccentric occlusion, and trauma results. It should be the routine of every dentist to have the patient return from time to time, because the voluntary eccentric movements of the patient's jaws are not necessarily the habitual masticatory movements.

5. Inlays fail because they are not properly contoured and finished. The patient has much difficulty in keeping them clean. As we well know, any filling whose margins cannot be kept clean by excursions of food and saliva and by the toothbrush is well on the way to invite recurrence of decay at its margins. The carving of sulci, in particular, often is incorrect, in that they are carved too deep. They should not be deeper than they were in the original tooth structure. It should be borne in mind that the larger the restoration, the less actual tooth structure there will be to receive the stress of mastication. Hence, an excessively deep sulcus increases the liability of weak enamel walls to fracture.

6. In Class 2 cavities (proximal cavities in bicuspids and molars), inlays often fail because the occlusal step is not made broad enough. The usual width of the occlusal step should be one-third the breadth of the tooth between the apices or tips of the cusps. Another less frequent error in cavity preparation for the inlay is the failure to make locks or dovetails in the step portions of these cavities. They should not be unnecessarily accentuated. The only necessity for such accentuation arises in following out a developmental groove. Otherwise, the

dovetail should have only sufficient spread to prevent a visualized matrix from being withdrawn therefrom mesially or distally, as the case may be.

7. Many otherwise perfect inlays often are rendered inefficient by the manner in which they are set. If the cavity is not thoroughly dried and the cement properly manipulated, the work of the dentist is largely nullified.

8. Probably the greatest deficiency in cavity preparation for inlays lies in the dentist's negligence in preparing gingival walls. We should know that the gingival walls must be flat and at right angles to the long axis of the tooth, and also to the buccal and lingual walls, especially in the dentin. A surprisingly large number of operators fail to apply this knowledge to practice.

9. Inlays fail frequently because of variations in the physical and chemical qualities of inlay golds, waxes, impression compounds, etc. Unless the dentist knows the characteristics of these materials and their behavior under such conditions as heat and cold, he may very often experience bewildering failures in his inlay work, even though he otherwise may have been exceedingly careful in his technic. Unfortunately, until very recently, little was known about the physical properties of materials used in dentistry. We all know that gold shrinks in casting. This, of course, results in the inlay's being smaller than the cavity in the tooth, unless the dentist uses a wax that expands in the same proportion as the gold shrinks. If he makes his inlays by the indirect method, two other elements, the impression compound and the amalgam die, complicate matters further and increase the liability to failure.

The Bureau of Standards, Washington, D. C., recently has undertaken the task of analyzing the various materials used in dentistry. They have published their findings from time to time in dental journals. It would be well for every dentist to acquaint himself thoroughly with these findings. Dentistry is sufficiently difficult when we know what we are working with; the difficulty increases when we work in the dark.

According to the Bureau of Standards, the average contraction of cast gold on cooling in the mold is 1.25 per cent. This shrinkage, of course, will result in the cast inlay's being 1.25 per cent smaller than the wax pattern. Unless the dentist compensates for this contraction by a corresponding expansion in the wax and investment material, his inlay will not fit perfectly. As a result of these findings, the manufacturers are making their materials comply more and more with the specifications of the Bureau. This is a great boon to the dentist, since inlays are probably the most common of the better types of restorations.

Inlay waxes vary a great deal with regard to the temperature at which they become plastic or workable. Such temperatures range from 104 to 122 F. Thus, we have waxes which may be spoken of as "hard," "soft" or "medium." According to the Bureau, it is more satisfactory to use the hard varieties, since they are less liable to distortion when being withdrawn from the cavity. They are more difficult to manipulate, but this is fully compensated for by their greater accuracy.

Many inlays are failures because of distortion of the wax pattern. In the indirect method of making inlays, the same liability to distortion may also be a characteristic of certain impression compounds.

The specifications of the Bureau of Standards with reference to their experimental wax No. 5 are given by McGehee in his "Textbook on Operative Dentistry":

The formula of the experimental wax No. 5 consists of 25 per cent carnuaba, 60 per cent paraffin (55 degrees C. melting point), 10 per cent ceresin, 5 per cent refined beeswax, and a small amount of oil-soluble coloring matter. Wax made from this formula becomes soft and plastic at temperatures between 45 and 50 degrees C. (112 to 122 degrees F.), when it may be worked into the cavity. It becomes sufficiently hard on cooling to room temperature to be readily carved to form without chipping or flaking and to be handled without distortion during withdrawal from the cavity and subsequent procedures. Also, it may be eliminated from the investment mold by heating to 250 degrees C. (480 degrees F.) or higher temperatures.

Does your wax conform to these requirements? It would be worth while to investigate.

I agree with Dr. McGehee that a good inlay wax should possess the following virtues:

1. It should have a reasonable coefficient of thermal expansion.
2. It should have high cohesive property.
3. It should not adhere to cavity walls.
4. It should be plastic at temperatures slightly above those of the mouth.
5. It should possess hardness at mouth temperatures.
6. It should not distort. (A good inlay wax will not bend before breaking.)
7. The color should contrast highly with the tooth structure.
8. Thin layers of wax should be translucent.
9. It should be volatile at low temperatures.

The Bureau of Standards, after much research, also has prepared seven specifications for investment material, and since investment material is another variable factor that, through excessive expansion or contraction, may cause failures, it may not be amiss to enumerate them, especially as they were approved at a meeting of the American Dental Association held in Washington, D. C., in October, 1929:

1. A minimum setting expansion for a 24-hour-period must be 0.05 per cent.
2. Minimum thermal expansion when heated from room temperature to 700 C. (1,300 F.), must be 0.6 per cent.
3. During heating, no shrinkage (below the original length), at room temperature, is allowable above 390 F. (200 C.). Not more than 0.15 per cent intermittent reversal of expansion below maximum length at lower temperature is allowable above the temperature of 390 F., and this must be ultimately compensated for.
4. The material must show a minimum compressive strength of 350 pounds to the square inch.
5. Average setting time must be fifteen to twenty minutes, except as specified for individual needs.
6. Ninety-five per cent of the investment must be capable of passing through a 100 mesh sieve, and all of it through a 30 mesh sieve.
7. The material must be satsfactory in all general features.

When these "variables" are taken into consideration by the dentist and an effort is made to correct them or compensate for them, there will be fewer unexplained failures in inlay work.

PORCELAIN

It would seem contrary to expectation that in most porcelain fillings, failures are due to improper cavity preparation, but apparently such is the case. One has come to think of all the difficulties of porcelain technic as lying in the construction of the matrix and in baking and finishing. Porcelain, of course, has no adhesive properties, and its retention is dependent on correct cavity preparation and cementation.

In proximoclusal cavities, a common mistake is to make the occlusal dimensions too small. The porcelain will require much bulk in this area to withstand the masticatory stress. Therefore, the buccal

and lingual margins should be extended well beyond the area of stress. Many times, this principle will necessitate the removal of the cusp portions of the tooth and make it advisable to carry the cavity over to the buccal or lingual surfaces.

The under surface of a porcelain inlay should be etched with hydrofluoric acid in order to give additional retention.

A more or less common mistake in baking porcelain is to allow the porcelain to become completely fused before it is placed in the furnace for the last time. Porosity and loss of fine shading often result from such treatment, and any porcelain that does not duplicate the color and character of the tooth structure is a failure.

Many dentists unthinkingly jeopardize their work by using inferior grades of amalgam for their dies. Some give too little attention to cementation, as to both the mixing procedure and the quality of the cement.

One should bear in mind that shrinkage and expansion may produce failures in inlay work of any kind if they are not understood and compensated for. One should use the very highest grade of amalgam for the construction of amalgam dies, and should be as meticulous in packing the die as in the other phases of the technic.

SILICATES

It is interesting to recall that in his textbook, written before silicates were introduced to dentistry, G. V. Black enumerates seven requirements for permanent filling materials. They are:

1. Indestructibility in the fluids of the mouth.
2. Adaptability to walls of cavities.
3. Freedom from shrinkage or expansion after being made into fillings.
4. Resistance to attrition.
5. Sustaining power against force of mastication.

He mentions as secondary or minor qualifications:

1. Color or appearance.
2. Nonconductivity of thermal impressions.
3. Convenience of manipulation.

It cannot be said that silicates measure up to any one of the primary qualifications. In other words, silicates fail because they are silicates. Of course, slovenly technic on the dentist's part will make them even worse failures. An acknowledgedly inferior material is unlikely to stimulate the dentist to his best efforts. He therefore is likely to be rather careless in making silicate restorations. If silicates did not possess a certain esthetic value at a comparatively small expense to the patient, I doubt that they would be used at all.

Of course, there are thousands of reasons that fillings of various types fail. I have endeavored to give you a few of them which have impressed me as being common, and therefore important.

106 Forrest Ave., N.E.

OCCLUSAL DEFORMITIES AND A METHOD OF DIAGNOSIS AS APPLIED TO OPERATIVE DENTISTRY*

By HARRY G. MORTON, D.D.S., Milwaukee, Wis.

THE first scientific effort to analyze, measure and determine mandibular movement began with Bonwell in 1850. From that time to the present, the profession has been endeavoring to understand and imitate these movements.

This naturally has led to differences of opinion. The questions today to my mind are whether protrusive inclinations of the mandible register planes on which the mandible moves, whether the occlusal surfaces of the teeth are a more important factor in determining all movement, whether the movement is made up of arcs or angles or is spherical in origin, and can these spherical movements be perpetuated.

Our nomenclature is most confusing; for we speak of the condyles and condylar movement as being something different from mandibular movement; whereas, condylar movement is synchronized with movement of the mandible, and, being the same thing, should be termed mandibular movement.

The mandible with its teeth, being the movable functioning unit, is applied to the maxilla with its teeth as a fixed unit which does not move, and therefore the forces should continue to be balanced unless other forces interfere.

Therefore, mandibular movement must embody the size and form of bony structures of the mandible and the maxilla, the form and relation of teeth in both mandible and maxilla, and the depth, width and length of cusps, before one can understand, measure and visualize these movements.

Moreover, a study of mandibular movements must involve the physics of forces and their application, as a difference in the relative position of fulcrum, lever and resistance will vary the pressure of the stroke.

Further observations lead me to believe, then, that the degree of inclination of the registration in a protrusive movement of the mandible is not primarily the guide in mandibular movement; nor do I believe that the occlusal surfaces of the teeth are wholly the guide to this movement. There is a relationship between these two factors in favor of the occlusal surfaces, because these surfaces represent the final destination or seating in this movement. Therefore, progressive changes in the occlusal surfaces of mandibular and maxillary teeth progressively alter, restrict and inhibit mandibular movements, the ultimate being the final resting place of the mandible.

A closer study of these physical forces reveals a vast difference in poundage of the stroke. Some persons, because of their temperament, never use in excess of 25 to 40 pounds; whereas, others use continually an effort that can be measured

*Read at the Seventieth Midwinter Clinic of the Chicago Dental Society, March 1, 1934.

at about 100 to 150 pounds, and there are many whose effort exceeds 350 pounds, which is the limit of measurement at the present time.

The methods of measuring this poundage are indefinite, because of a lack of instruments that register accurately, but, for all purposes, even the crudeness of these attempts gives most illuminating data.

A normally arranged set of teeth in a highly developed person offers interesting observations. We use such terms as "cusp angles"; whereas in nature, these cusps are arcs. That is not saying that abrasions do not appear on surfaces of teeth changing arcs to angles.

In further considering mandibular movement, the position of the teeth, the height and width of angles of the cusps and the shape of the mandible and maxilla must involve a further study of the muscles of mastication with their origin and attachments, because, if there is a difference in poundage, there will be a difference in relative pull of the mandible, which leads to habit-forming positions and excess biting poundage, especially in the rest period, as, I believe, all damage takes place during this rest period rather than in mastication.

This thought should be carried farther, as little has been done to prove or disprove it. There is probably no one part of the human body more susceptible to movements, during rest, than is the mandible, which, in its movement and tension, is most destructive. Anatomic facts are easy to visualize; whereas, abstract facts are more difficult of comprehension; hence, our differences of opinion.

As teeth are lost, contacts broken, and negative filling materials, as well as negative restorations of any character, appear, it is natural that the normal flowing action of the mandible is interfered

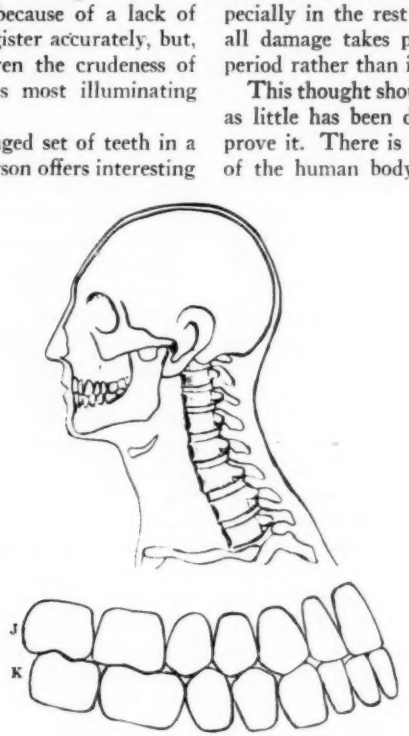


Fig. 1.—Relationship between occlusal surfaces.

with and the vertical dimension is lost, and an increasing retrusive inclination or, in some cases, a protrusive inclination results, as well as changes in the median line relation.

In neutroversions, tooth structure suffers. The untimely eruption of the third molars or the eruption of either the maxillary or the mandibular third molars, after the removal of either one or the other, again inhibits movement and causes side slips. These resultant movements have been ear-marked with names, one being called Bennett's movement.

The question in the Bennett movement is, do we find it in the normal arrangement of teeth, or is it a progressive creep-

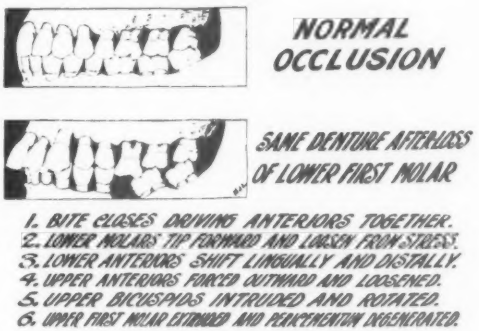

NORMAL OCCLUSION
SAME DENTURE AFTER LOSS OF LOWER FIRST MOLAR
1. BITE CLOSES DRIVING ANTERIORS TOGETHER.
2. LOWER MOLARS TIP FORWARD AND LOOSEN FROM STRESS.
3. LOWER ANTERIORS SHIFT LINGUALLY AND DISTALLY.
4. UPPER ANTERIORS FORCED OUTWARD AND LOOSENED.
5. UPPER BICUSPIDS INTRUDED AND ROTATED.
6. UPPER FIRST MOLAR EXTRUDED AND PERIODONTIUM DEGENERATED.

Fig. 2.—Normal occlusion and same denture after loss of lower first molar.

ence without question; whereas, another group of conscientious objectors take exception to any question of study which will disturb the equanimity of their daily routine.

These are the reasons that it is difficult to present this subject in anything but a broad way. Quoting from a paper on "A Theory of Occlusion," by George H. Maxwell, of this city:

> The movement of the mandible is a beautiful and perfectly coordinated symphony, in balanced occlusion and discordant notes occur only in unbalance. . . . The difficulty of comprehension lies primarily in the fact that we must deal in both the concrete and the abstract—in other words,

ing into mandibular movement as a result of the loss of integrity of the occluding surface, and, if so, can it be accurately measured to be again reincorporated in a new occluding surface, or, conversely, is it necessary to incorporate this so-called movement in the new alinement of mandible to maxilla, if it did not prevail in the original state?

Naturally, to those studying, thoughtfully and conscientiously, the variable movements of the mandible, this study, being governed by logic, leads to a difference of opinion, accepting the differ-

the anatomical facts are variable owing to the movements of the mandible and this variability adds to the difficulty of visualization and hence comprehension.

If it is true, then, that, in normal occlusion, the surfaces of our teeth collectively, anteriorly, posteriorly and laterally, represent the segment of a sphere; that the intimate details of cusp form are arcs; that the contact of these mandibular teeth with the maxillary teeth are likewise arcs, all movements that prevail on these surfaces are and should be spherical. To me, this seems reasonable.

Occlusal deformities are probably the commonest of mouth lesions that the dental profession comes in contact with. These deformities are not always recognized nor classified in operative dentistry, except as their recognition would lead to the patient's being referred to the orthodontist for treatment. These mouth deformities, therefore, present many interesting phases, in both their recognition and their development as well as causative factors, and in presenting this paper, it must be approached in such a manner that the average man may have a better understanding of his responsibility toward these cases of malocclusion. In the field of orthodontia, these cases are usually seen in the early stages, in which progressive treatment leads to a more nearly ideal occlusion; but, unfortunately, the dental profession as a whole has, for one reason or another, let these conditions exist into adult life, where correction, if any, requires a realining of the forces which maintain balanced occlusion; whereas, many of the cases of malocclusion that we see today were in youth normally balanced and occluded. In presenting this subject I am, therefore, mindful that the question is approachable from four distinct points of view: (1) early deformity, which should come under orthodontic treatments; (2) those cases in which, for various reasons, no correction has been offered or applied; (3) a group wherein the deformity usually expressed itself through the loss of tooth contact, occlusal surfaces which have become negative by wear or the use of negative filling materials and early extraction, and (4) natural unfavorable relations of mandible to maxilla. Further discussion of occlusal deformities before an audience of this kind must be confined to a practical expression of those conditions which we meet daily and in

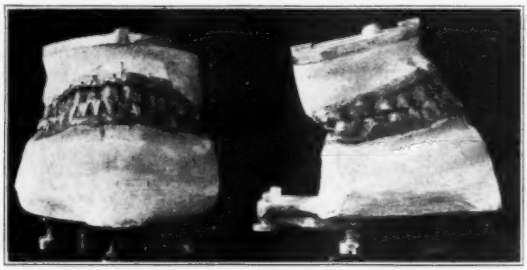


Fig. 3.—Neutroversion wherein vertical dimension has been lost by continuous movement of mandible to maxilla.

Fig. 4.—Retrusive movement of mandible.

which there is every evidence of unbalance in the masticatory stroke. Therein is further evidence of degeneration in the alveolar border, which usually is indicative of some traumatic lesion. Study of these lesions has been observed by four distinct groups of men: those who are doing research work exclusively; those who are making practical application of research through orthodontic measures; those who are studying periodontal lesions, and those who, recognizing deformities, are endeavoring to make a correction through refunctioning of the mandible.

This leads us into many interesting phases of causative factors in these occlusal discrepancies. In a recent article by Harold Keith Box, of Toronto, in which he describes the Synge theory of tooth movements, it is stated that trauma may cause malocclusion and, in turn, malocclusion may cause trauma. These observations are exceedingly interesting, but one wonders at what point trauma, which causes malocclusion, ceases and malocclusion causes trauma. Box, cooperating with Hopewell-Smith, Noyes, Gottlieb and others, has most interestingly observed the phenomena of tooth movement, in which he characterizes physical function as follows:

(*a*) It acts as an apparatus for diminishing the force of concussion with an opposing body, whether it be dental or otherwise. [Hopewell-Smith.]

(*b*) It affords a fibrous attachment to the teeth. [Hopewell-Smith.]

(*c*) It provides a layer of soft material in which blood vessels and nerve fasciculi, to supply the teeth, may ramify without risk of damage or permanent and inoperable injury by mechanical shock. [Hopewell-Smith.]

(*d*) It also sustains the soft tissues in their proper relation to the teeth. [Noyes.]

(*e*) Through its principal fibers, it transmits under loading functional stimuli to the alveolar bone. [Gottlieb, Orban.]

He says further: "The present widespread endeavor on the part of many investigators to estimate the significance of physical function of the pericementum in periodontal science points to the fact that we have definitely passed into the field of theoretical physiology."

STRESSBREAKERS

I would add that I believe the stressbreakers in the mandible are: (1) the cusps; (2) the peridental membrane with its sets of fibers; (3) the meniscus or pad over the condyle head. In the maxillary or stationary structure, we have as stressbreakers: (1) the cusps; (2) peridental membrane; (3) a honeycombed, resilient bony structure in which the maxillary teeth are held. These I should term stressbreakers, for without resiliency in the original cusp form which modified the end of the stroke by allowing lateral play and which is largely obliterated as arcs become angles, we lose the stressbreaking effect of movement after contact.

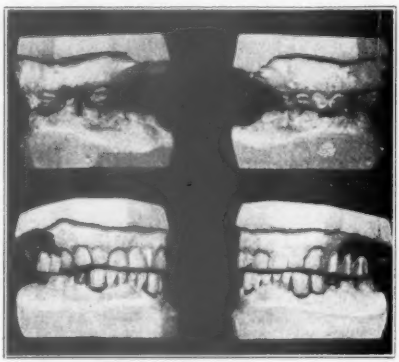


Fig. 5.—Retrusive movement of mandible.

The foregoing quotations are among the important contributions to our knowledge of the theoretical physiology of tooth movement, but, from the opera-

tive standpoint, it is needless to say that these contributions must be used with economic reason; otherwise, we, the practicing dentists, will go off on a tangent of theory which may be disastrous. Again, if, as Box states, trauma causes malocclusion and, conversely, malocclusion causes trauma, when does one begin and the other cease, or vice versa? Do teeth extrude and, conversely, are teeth driven into the tissues by abnormal pressure? These observations must be made by the student of operative dentistry, if he is to comprehend fully a nonfunctioning occlusal relationship.

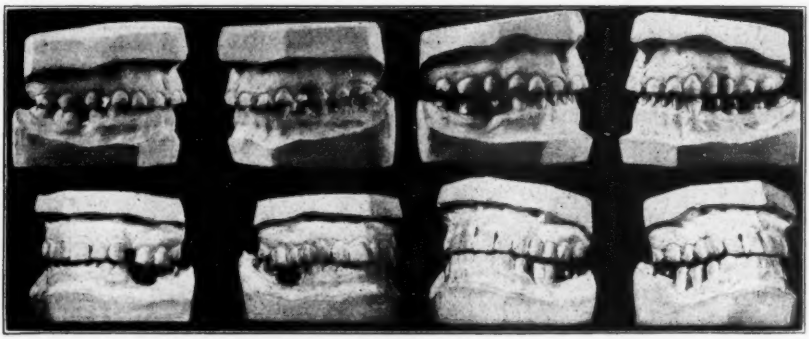


Fig. 6.—Retrusive movement of mandible.

I shall confine the discussion of occlusal deformities to three types:

First, the neutroversions, wherein vertical dimension has been lost by a continuous movement of mandible to maxilla, a constant wearing away of tooth structure without any apparent deviation from neutral relation other than a possible disturbance in the median line, commonly called end-to-end bite. These types wear down progressively because of the overpoundage of the muscle pull, an ever-increasing activity of the mandible during the rest period plus a difference in enamel and dentin structure. It has been my observation that no tooth destruction or displacement of mandible to maxilla, or the malpositioning of teeth, takes place other than through overactivity during the rest period, at which time the body is under constant movement and tension. A close study of tissues of the body at rest reveals that no part of the body is quiet during rest and there is no part of the body so prone to excessive movement and pressure as the human jaw. These neutroversion cases, in which excessive wear has cut down the normal dimension of the tooth to a point where the posterior teeth become sensitive and the anterior teeth become inartistic are a very common type.

Again, referring to the picture of the normal occlusion, we note whether the first molars are in normal relationship one to the other, whether there has been any interference in the eruption of third molars, which frequently are factors in displacing or limiting the mobility or balance of these neutroversion cases. The recognition of this type is simple. Their full correction is not always indicated, because, if the patient is a man of vigorous type, the destruction has gone on over a considerable period of time, and

there are usually no unpleasant manifestations which lead to discomfort. There is usually considerable freedom of the mandible, with a strong inclination to the protrusive movement rather than the retrusive; i.e., it is usually continuously held in neutral relation.

The most common type, and the one which we see almost continually in our practice, is that in which there has been a retrusive inclination of the mandible. The positioning may have been quite normal in semi-adult life or earlier, but usually the injudicious loss of the first molar has been the first break to cause the retrusive movement of the mandible. Over a progressive period of time, if the muscle pull is not too great and if the integrity of the tooth structure is fair, there will be compensation in any destruction in and around the glenoid fossa. It is my contention that we seldom have disturbing conditions in the fossa area, if the compensation of a loss of vertical dimension by the destruction of tooth structure or the loss of vertical dimension of the remaining teeth can be and is compensated for in the glenoid fossa. There are many cases in which the opposite prevails; i.e., there is a more rapid loss of vertical dimension than can be accommodated in the glenoid fossa and an acute disturbance results in and around that area.

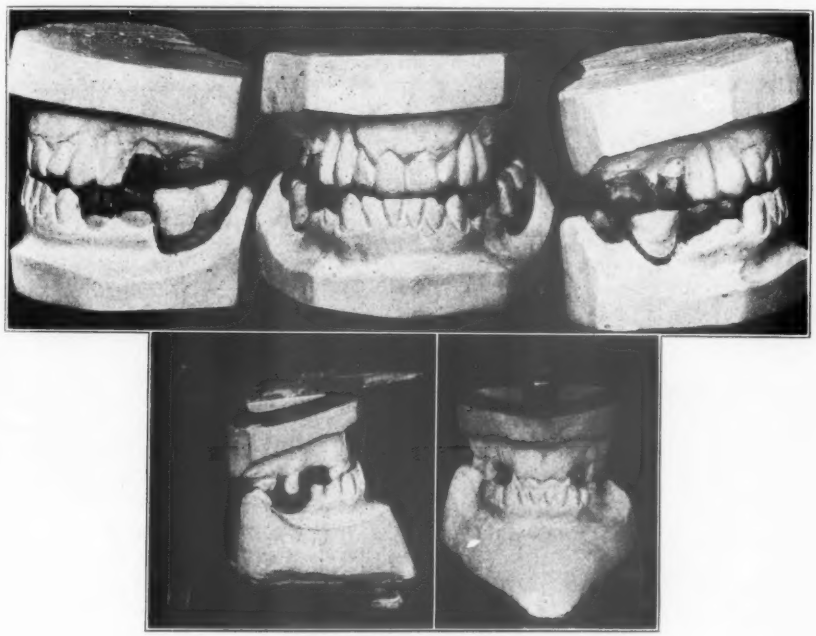


Fig. 7.—Case of protrusion.

The phenomena of the retrusive inclination of mandibles with a locking of the bite, a restriction of the movement of the mandible and habit forming movements or lack of movements, with an in-

creasing poundage in rest position, or conversely, an increasing poundage in concentric position, lead to many manifestations. Whether these manifestations can be all laid to one or two physiologic conditions is a question. It is a question whether the thickness of the periodontal membrane is a factor in excessive movement of certain teeth and destruction of the alveolar border or the manifestation of some degenerative disease in this structure, or whether the overpoundage of the periodontal lesions arise, and have we a right to presume that there can be some correction and help offered? Is there an economic possibility in the reestablishing of occlusal balance in these cases or, conversely, are we to be satisfied to let this mouth undergo disuse atrophy without interfering, or if any change offered by increasing vertical dimension only accentuates the deformity for lack of a geometric diagnosis?

Again, let us consider the few cases of

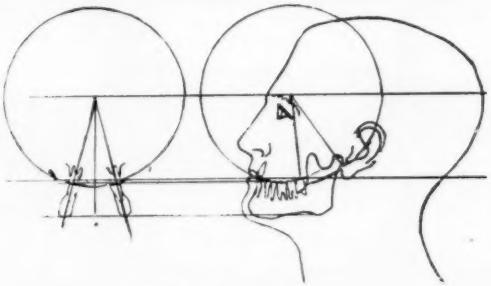


Fig. 8.—Curve of Spee.

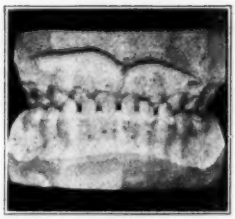


Fig. 9.—Protrusion, the result of habit, in deciduous teeth.

muscle pull or a lack of distribution of pressure throughout the occlusal surface is not the causative condition; but these discrepancies of weight distribution indicate the difference in reaction of individual tissue structure to these irritants.

Now the question immediately arises, are we able to agree that if the mandible goes into a retrusive inclination, the bite locks, occlusion is out of function and protrusion, either natural or acquired, which come to our attention. This group of cases are of least favorable prognosis, and yet offer a most interesting study for correction.

These groups usually manifest an esthetic shortness of vertical dimension in childhood, and it is my opinion that in many of them this is acquired quite early in life through unconscious habits which are not easily corrected. As an illustration, the shape of my mouth, which has always been in protrusion, can be seen in the second generation. I have a grandson who has a perfectly normal set of deciduous teeth, but who constantly, when interested in anything the parent suggests, responds with a happy smile and the protrusion of the lower jaw. There is also at anything unpleasant, such as reprimands or denials, the same protru-

sion, so, at the age of 4½ this child's teeth are seldom in a neutral relationship, as he has already acquired a protrusion which undoubtedly will manifest itself in the relationship of the second set of teeth. We also have had one case in which this same condition prevailed and which became so bad that orthodontic means were used for the correction.

Now in these three groups which I have mentioned, our problem is this: Are we in a position to offer help or shall we say that nature must take its course? The causative conditions, as I said before, were in most cases the injudicious removal of teeth, the breaking of contact between teeth, the use of negative fillings and filling material, negative occlusal restorations, repositioning of mandible to maxilla, lack of movement of the mandible, locking of the bite and unbalancing of the occlusal rest with all its accompanying disturbances as evidenced in the difference in the reaction of tissue to irritants. Probably, and rightfully, no group of men have so wholeheartedly disagreed as in theories of occlusion, and I believe in this disagreement better good has come than if we were to be of the same mind. From the day of Bonwill and his equilateral triangle, which was the first scientific geometric effort given to the profession, to the present, we have had three or four outstanding groups who differed primarily as to the movements of the mandible in relation to the maxilla, and, while each one offered much, they were all inclined to have in mind the adaptation of some instrument which would relate models of the mouth in motion to their ideas. Strange as it may seem, fundamentally they were all very much alike. In the final analysis, they all quite agreed that the movements of the normal mandible are spherical. Without going into a discussion of the various theories, it is beyond question that if the deformities which I have shown are facts, there should be some method of diagnosis other than guessing, as it would seem that guessing is a very difficult thing to interpret without basic reasoning.

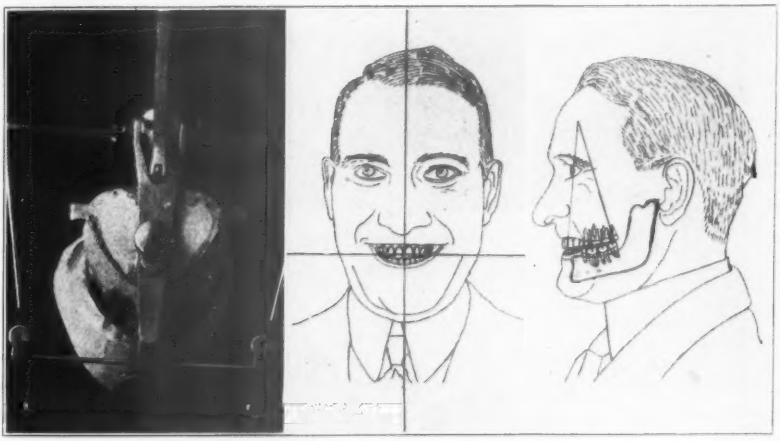


Fig. 10.—Orientation of casts; i.e., placing of casts in definite position with respect to objects relating to their movement.

Again quoting from "A Theory of Occlusion," by George H. Maxwell, and as the basis of mathematics, mechanics, anatomy and function and the correlation of facts, we have some very interesting theories. Without elaborating on this theory of occlusion, I call attention to one or two clauses which appear in this article.

That the maxillary and mandibular teeth are so shaped and arranged that all mandibular teeth, as a functional unit, make contact with all maxillary teeth as a functional unit and that points of contact on the maxillary teeth which lie within the surface of the spherical arc obtain when these dentures are in a position known as centric occlusion and that the contact occluding spherical arc is its concentric and identical with the mandibular spherical arc, and that points of contact of the upper and lower incisors and cuspids are also within the contact occluding spherical arc in that position and that the mandible and contact occluding spherical arcs are identical in that position. . . . The explanation of this theory is based upon the proposition, almost axiomatic in simplicity, that two spherical arcs of equal length and ratios, when brought into position, are concentric.

In other words, if Count von Spee and his associates, in the physics of anatomy, showed that collectively the surfaces of the teeth in the mandible were an arc, anteriorly, posteriorly and laterally, all movements upon these surfaces must be spherical. It would seem that that statement is beyond dispute. Further, if it was true that Bonwill's measurement of the mandible established a triangle, the theory of the late George Monson that the basic triangle can be pyramided and transposed into a spherical triangle is also tenable, and it is upon this basis of thought that we have a system of geometric diagnosis which will, in an orderly way, determine the loss of vertical dimension, show which teeth in the mandible and the maxilla are out of dimension for balance, and offer an opportunity to replace tooth surfaces, which will allow of a balance in occlusion.

If there is any one thing which has led to misunderstanding, it has been the question of discrepancies in occlusal di-

Fig. 11.—Orienting spherical positions.

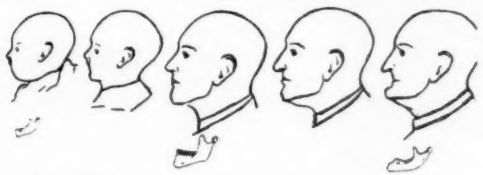


Fig. 12.—Changes in condyle from infancy on. In the sixth year, the condyle is usually an equilateral triangle, changing with time to one of unequal dimensions.

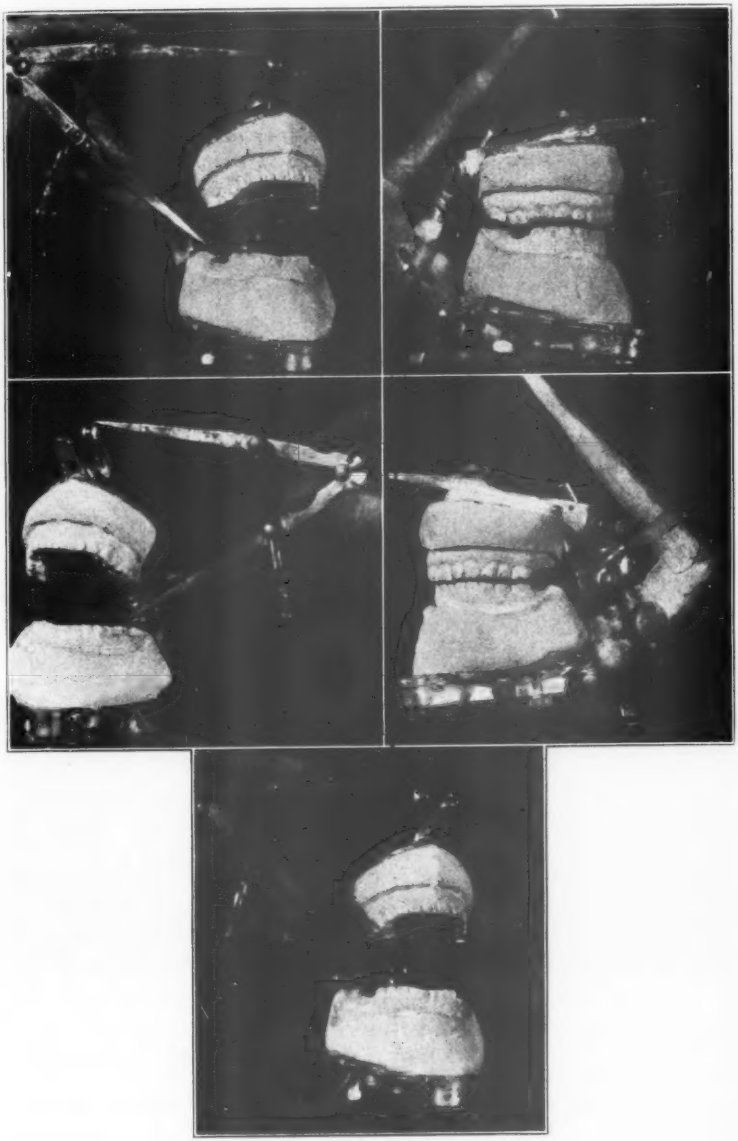


Fig. 13.—Mounting of casts with aid of calipers.

mensions, and yet it has passed beyond the realm of doubt, as is evidenced by those working with this phase of dentistry.

The two questions arise: If it is practical that a correction be made, shall it be made along the lines suggested by a good guesser? Or is there a practical scientific method to determine the amount of lost tooth structure and the advisability of a replacement to the individual's occlusal requirements, not ideal, not normal, but his esthetic mechanical requirements? If this is true, we must have an instrument that will depict the movements of the mandible, and the question is immediately raised as to whether we have an instrument that will do these things. I know of no way to argue this question except by a practical demonstration; and therefore if we accept the theories of Count von Spee, Bonwill, Walker, Gysi, Christianson and others, we must have a means of orienting the casts of the human mouth, an instrument registering the positions of the mandible through the medium of the checkbite. Without this, I think it is impossible to visualize the positioning or lack of posi-

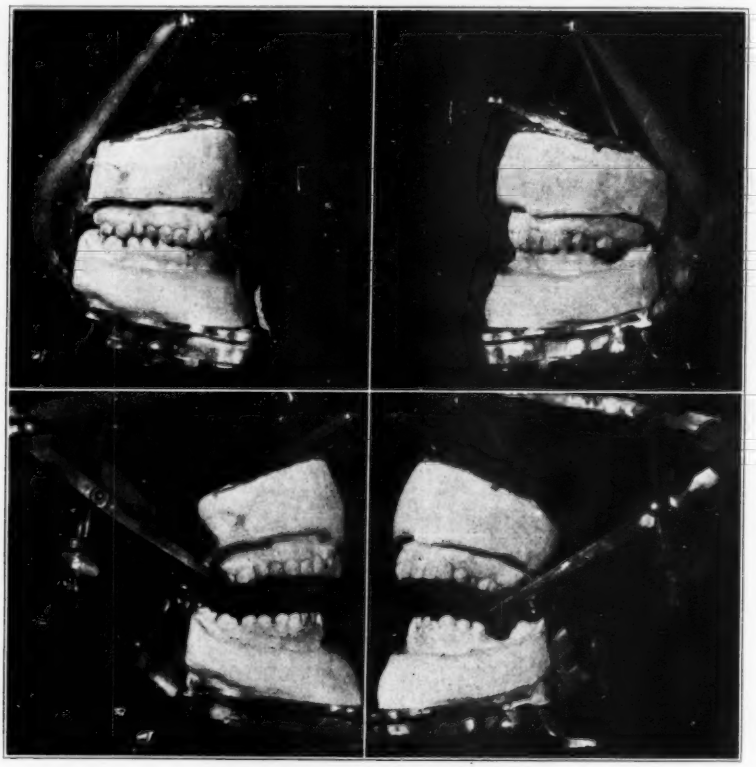


Fig. 14.—Mounting of casts at 4-inches, noting posterior discrepancies.

tioning and movements of the mandible.

There are several instruments which will do this work, but the instrument of the late George Monson will do it to my satisfaction, provided the spherical theory and necessity for the orientation of casts are understood.

"Orientation" is one of the most interesting words, especially as pertains to dentistry. Orientation means the placing of anything in some definite position with respect to other objects, particularly if those objects relate to its movement. How is it possible to apply the mechanical means (hinges) to open and shut a door without having the door in relationship to its surrounding objects—orienting the door to the frame? How is it possible for us to play golf if we cannot orient ourselves to the surrounding objects, these objects being the golf ball and the cup? The player, the lower cast; the golf ball, the mandibular teeth; the cup, centric relation; the golf club, the instrument; the muscles, motive power mechanism. We orient our bodies to these surrounding objects. Our success or failure depends on variable arc centers.

Some men are a little cocky because they have made a hole in one. Most of us think we are clever if we can get within two putts of the cup, if it is an approach shot. The same thing applies to the cast of the mouth. It must be orientated to surrounding objects, which are the mandible in its relation to its opening components, the maxilla. With the orientation of those casts brought into movement, or with lack of movement, will be depicted the balance or unbalance of the human jaw and teeth. Against all this, we have men making imperfect casts of the human jaw, putting them onto a device which opens and shuts with no possible relationship to the positioning of the casts as they prevail in the human mouth; and they expect to help restore lost mandibular movement. If anything, they merely accentuate the deformity. Therefore, is it practical to diagnose these cases, mount them in a laboratory, check them with checkbites and determine what the future dimension shall be? Good impressions are taken of the upper and lower jaw and models run, preferably in stone, to conserve all anatomic features.

The next step is a facebow measurement, which consists, first, of determining with a pencil mark a spot that would approximate the head of the condyle. There are various methods for determining this location. Simons' method consists of determining first the orbital plane. The Monson method consists of placing a straight edge on a line between the tragus and the ala of the nose. A spot on the line one half inch in front of the tragus is the average identification spot for the condyle head.

This question of identifying the condyle head is immediately subjected to criticism by many as being too indefinite. To my mind, it is the first identification mark in forming the Bonwill triangle, and it is no different from any other method used in diagnosis to determine the position of internal organs, and bones and other structures.

The Bonwill triangle as you know, consists of a line drawn through the head of the condyle as one dimension, from the head of the condyle through the occluding surfaces of the central incisor teeth as the second dimension, and from the incisal edge to the opposite condyle as the third dimension.

A further observation of the Bonwill triangle reveals some interesting facts for which we must give the late George Monson due credit; namely, that the condyles of a child up to the sixth year are usually an equilateral triangle, but from the sixth year on, when function

begins with diversification in the use of foods, this triangle changes from an equilateral to one of unequal dimensions.

A further objection is that this identification mark for the condyle head is one-half inch outside the actual head. This objection has been overcome by the use of the Bjorklund arc condyle cord, which compensates for the variable skull dimensions from childhood to adulthood.

The facebow with wax bite is adjusted in the closed position without the jaws under tension and the cord arms are adjusted to the points marked over the condyle head. The screws are locked and the case is ready for mounting. The instrument with its cords in place is now ready to receive the cast through the medium of the facebow measurement with the facebow cords in contact. With the cords of the instrument, which in one dimension is now adjusted with the aid of a caliper set to 4 inches to find the second dimension of the triangle, with the cast adjusted to receive the 4 inch dimension, note is made at what point posterior teeth come into the caliper's dimension.

Usually, we find that most cases can be mounted to 4 inches with the posterior teeth showing a like dimension on one side and minus on the other. Other cases are all minus, and still other cases with the posterior teeth either one side or the other are shorter than 4 inches.

These variable combinations of lengths of posterior teeth lead to a great deal of discussion because of a lack of understanding of what is taking place.

One method of mounting would be to change the 4 inches of the normal caliper dimension to plus or minus until such dimension is found as will carry the majority of teeth within a given radius.

Another method is to mount them all at 4 inches and note the posterior discrepancies as represented by plus or minus. The combinations thus resulting lead to much misinterpretation of the theory in its application, as we run into so many discrepancies that no set rule can be followed in the mounting of the casts unless one were to adhere strictly to a 4-inch mounting in each case. If the 4-inch mounting is determined on the cast and is cemented to the instrument, the upper cast is put in its place, and then, with the use of checkbites, we determine the accuracy of the transfer. If the mounting is correct, these variable positionings through checkbites will register. That does not mean that the angles of movement between the checkbite position on the instrument would be the same as the angle of movement between the checkbites of the mouth. It is merely registering distinctly the three positions that the mandible goes into.

We then release all set screws on the instrument and allow casts to move into all positions, noting the unbalance or the lack of interference in the law of overbite equaling overjet, so that one may visualize all the discrepancies which exist in the human jaw.

We can determine whether an increasing vertical dimension is needed on one side or the other, or the upper instead of the lower, or both, until a decision is made as to what this mouth requires in vertical dimension to restore movement.

I shall not enter into a further discussion of the methods required to build shims for the new cusp dimension, as we are merely showing the diagnosis, with possibilities of restoring a new occlusal surface.

It is obvious that this is not the place to discuss the technical procedure of any theory. Its exposition should be confined to study groups who are ready and willing to attempt to banish the prejudice and ignorance which already exist in the

human mind and are open to the conviction of diagnosis. Suffice it to say that a facebow measurement, casts of the mouth and understanding of the Bonwill triangle, permit the transposition and pyramiding of the triangle, fastening the cast to an instrument and checking the three positions offered by the checkbites, and from this determine what corrections shall be made.

CONCLUSION

The accompanying illustrations show various cases of deformity in which corrections have been made. The patients are the most appreciative evidence of correct deductions. Are these phases of malocclusion which we have discussed a part of operative dentistry? Are we in a position to recognize these deformities and offer to the public a method of correction? Or is it unwise to discuss farther lockbite and lack of functioning of mandible to maxilla? Shall we go into a technical discussion of the muscles and muscle pull? Shall we determine whether the eight sets of muscles of mastication are actually, in their origin and attachment, concentric in their pull to the center of force? Are we to be interested in the mandible and its glenoid fossa to determine the arrangement of the stressbreakers which enter into this masticatory apparatus as a possible answer to some of the clinical factors which enter into its mutilation? Shall we be interested in the periodontal membrane and its intricate muscle and blood supply to determine whether its intimate physical characteristics have a bearing on the deformity or loss of these teeth? Are we to be interested in cusp form in the major cusps and the minor cusps as brought out by Dr. Maxwell's paper on a new theory of occlusion? Shall we be interested in the spillways? Are we interested in the difference in the poundage of the masticatory stroke or shall we say "This is very largely applesauce and I am content to replace lost tooth structure in the way of least resistance?" For many men, I can truthfully say that this is the best they can do, and if they are perfectly satisfied, this is the best thing for them to do. For many more men, it is a very unhappy situation to be in, and it would seem that there is no profession wherein there are quite the opportunities that the dental profession presents to use some of the material at hand to correct the enormous number of deformities which are receiving actually no consideration.

This means that men must banish prejudice, open their minds to new thought and new study, become dissatisfied with their growth and development and seek new channels for expression.

The dental profession has not scratched the surface. What this examination of the school children of the United States is going to reveal may be somewhat shocking, but if it is shocking, it shows that no one is more responsible than we in the profession and I urge that more of us study these opportunities that are always before us.

PRESIDENTIAL ADDRESS, PAST PRESIDENTS' CLUB, 1934

By C. VICTOR VIGNES, D.D.S., New Orleans, La.

I AM reminded of what I said over thirty years ago at a dinner given to the late Dr. George J. Friedrichs, in celebration of the fiftieth anniversary of his graduation as a dentist. Answering the toast "The Dental Profession," I spoke in part as follows:

For many years, dentistry was regarded as a calling lacking in professional dignity, if not altogether devoid of that character. But, today, by the dentist's efforts and exertions, his standing as a professional and scientific individual has been placed beyond dispute.

The steps that have led to this happy condition have not always been through an easy path. The difficulties that had to be surmounted, the prejudices that had to be combated, were many and varied and often came from unexpected sources.

What the dentist has done toward his advancement, professionally and scientifically, was done through his own efforts only, without the assistance of the allied branches of Medicine; but in a measure, despite their unsympathetic, opposing influences . . . and if the dream of those who wish to bring about a coalition of these two professions is realized, it would sound the death-knell of dentistry as a profession, discredit the efforts of those who have gone before and be a monumental and ungrateful reproach to their earnest and zealous endeavors.

After I have nursed these sentiments for so many years, you can understand my delight when I read in the December, 1932, issue of the *Journal of Dental Research* the very serious and dignified monograph by William J. Gies, Ph.D., Sc.D., LL.D., entitled "The Status of Dentistry, in which, writing as a layman, without bias or prejudice, he has deftly treated (probably as he alone was in a position so to do) the recurrent vexing question as to whether dentistry should maintain its present autonomy or complaisantly cede to a clamorous few and permit itself to be absorbed by organized medicine. Dr. Gies sets forth the possibilities of the one calling and the necessary limitations of the other, in detail, so clearly and convincingly, yet so pleasingly, as to give ground for offense to neither profession. And I hope that the dental press will give Dr. Gies' generous offering to our profession the publicity it deserves.

The dentist has always appeared to me to be somewhat confused—uncertain as to his relative position as a health servant. Call it lack of self-reliance, modest reserve or whatever you will, the fact remains that he has failed, so far, to assert himself and claim to the full that degree of professional importance that his increasing services to humanity entitles him to. Strange, but he seems also to have lost much of the love, pride and enthusiasm that must have been the inspiration of the fathers of dentistry in their efforts toward the uplift of our profession. The need to struggle still exists.

I invite the dentist, then, to read Dr. Gies' sympathetic paper and see how he dispels the doubts that seem to beset us;

how understandingly is presented our professional development; how the worth of our services to mankind is brought out and evaluated and how encouragingly we are urged on to the attainment of a greater ability to serve, if we but continue (if I may use the term) "to specialize in our specialty."

Then, too, with this clearer concept, might we not be aroused to a sense of righteous indignation and be spurred to vigorously protest against the slights and incivilities so gratuitously offered us. For instance:

(*a*) The Final Report of the Committee on the Costs of Medical Care contains a footnote in which dentistry is grossly misrepresented.

(*b*) The Final Report of the Committee on Medical Education recommends that dentistry be made, like nursing, a profession subordinate to and controlled by organized medicine.

(*c*) The Commonwealth Fund issues an important volume on "Standard Classified Nomenclature of Diseases," giving an impressive list of the many national medical organizations that were invited to cooperate. No dental organizations are included in the list.

(*d*) The Surgeon General of the U. S. Navy, by a stroke of the pen (evidently without consulting the dental profession), officially renamed the Dental Service in the Brooklyn U. S. Naval Hospital the Stomatological Service.

True it is that two or three members of the profession and a few individual societies (notably, the Dental Educational Council of America) have been driven to resent these recent insufferable assaults; but it is from organized dentistry, rather, through its national body, that an official pronouncement must come to put an effective stop to the indignities to which we are but too often subjected.

In this circumstance, to remain indifferent—to continue to ignore, is but to invite further affronts. Let us fight back; be aggressive; retort in kind: the proper and dutiful attitude to take in this particular instance.

MEDICAL JOURNALISM*

By J. ARTHUR MYERS, M.D., Minneapolis, Minn.

IN the little German town of Mainz in the year 1450, Johan Gutenberg invented movable type and changed the whole course of human affairs, human knowledge, human education and human science. Seven short years later, in 1457, medicine made its first use of the new invention when a humble follower of the science set up in the very same type used for the Gutenberg Bible the unique Purgation calendar (Laxier kalender of 1457).

From that day to this, the printing and literary arts have continued to serve as handmaidens to medicine, and have assisted at the accouchement of every important medical discovery and advance which has taken place in the centuries that separate us from Johan Gutenberg and the Laxier kalender.

Through the centuries, medical men who were also litterateurs have decorated the pages of the world's literature with

*Read before the Dental Editors' Club, Aug. 4, 1934.

many a great name. From Rabelais with his astounding insight into human nature and his sometimes amusing insight into medical science, to Somerset Maugham and his tale "Of Human Bondage," which is a medical student's struggle with the flesh, medicine has done her share in keeping the printing presses of the world in worth-while motion.

Of much more interest to us here and now is the simultaneous development of a literature and a press that are medicine's own possession, for, by and of medical men and their science. It is a far cry from the Laxier kalender to 1628, when William Harvey saw the first copy of *De motu cordis* run off the Frankfort press; but, in the meantime, the presses of all Europe have been busy with a thousand medical works expounding new theories and discoveries, fact and fancy, progress and quackery, with equal impartiality and great vigor.

It is an equally long leap from 1628 to the writings of Sir William Osler and our own age, which has seen the promise made by Harvey so richly fulfilled in the medical literature being produced by a thousand earnest students. With the improvement in the printing arts, and in our own science and its methods, has come an improvement in our scientific literature; nevertheless, there is no reason that we should deprecate that early work, for no matter what may be its permanent value, we can still say: It served its purpose.

The nineteenth century is the turning-point in any survey of medical literature and journalism; for it was during its course that a development occurred which has set its stamp on all subsequent medical writings, at least as far as their physical form is concerned. Prior to the beginning of that century most, if not all, medical literature was in book or pamphlet form, printed by the writer, at his expense and for such as cared to buy. The advance of the century, the increase in population and in the number of medical practitioners, along with a narrowing or at least a specialization within the possible field of research, were the prime causes of a split in the stream of medical writing and the source of medical journalism. Medical writing as a result of that split can be roughly classified as being of one of two types:

The first type, which follows the old route, the historic route, consists in the writing and publishing of books on medicine by medical men. This type of writing, too, is greatly specialized, but its outstanding characteristic is that it usually embodies an extended treatment of all phases of a given subject. It may or may not concern itself with current developments in its field. Its main object is to present all verified knowledge and the results of all research to date in a certain sphere of medical science. Its classic example is Gray's Anatomy.

The second type of writing is peculiarly modern and peculiarly in keeping with the tempo of the times in which we live. It is the periodical of medical literature, sometimes described as medical journalism because it appears in journals at regular intervals, just as newspapers and magazines, the particular field of the professional journalist, appear; every day, week, month or quarter. Its characteristic example is the short article covering a single piece of research, or covering the known results of research in progress. Any given article may or may not be of permanent importance, but they all serve a purpose in keeping the wide-awake practitioner in touch with the developments in his field, general or specialized.

It is interesting to note that the two types of writings just described have continued to exist side by side, without either's encroaching on the other's territory.

Through the greater part of the nineteenth century, medical journalism was not the scientific and competent calling that we now are proud to call our own. A glance at the names of a few of the journals of the times is in itself sufficient to drive away any genuinely scientific reader. The editors of some of them did indeed, as Oliver Wendell Holmes so aptly put it, "chew the juice out of all the superlatives of all the language of the Fourth of July orations." Witness these high-sounding titles for simple, truth-seeking medical journals: *The Granite State Medical Revolutionist and Hygenic Advertiser, The Georgia Blister and Critic,* the *Puget Sound Sanitarian and Prohibitionist,* the *Quarterly Review of Narcotic Inebriety,* the *Divine Science of Health,* the *Southern Homeopathic Pellet,* the *Indiana Scalpel,* the *Uric Acid Monthly* and the *Dental Jairus.* It took the caustic pen of J. S. Billings to turn the tide, and sanity and dignity came to genuine medical journalism after his great bout with charlatanism; a sanity and dignity that were enhanced by the appearance of the Index Medicus in 1879 and the Index Catalogue in 1880.

There was a time when the physician, after graduation, could practice his profession throughout life with practically nothing by way of literature except the textbooks he used in school. So little change was taking place; almost nothing new was being added to medical knowledge. Even today some physicians attempt to go through life depending on what they learned in medical school, but before they have passed the first decade, they are out of step with the medical profession. Osler warned us against such a short-sighted policy. These physicians are out of date within the first decade, medicine and the closely allied fields having become so specialized because of the vast amount of research and careful observation being carried out in various parts of the world, with new knowledge concerning disease resulting. While textbooks serve a good purpose, many of them are not revised at sufficiently frequent intervals, often because too large editions are published and publishers prefer not to bring out revised editions until the previous one is sold.

It is not uncommon for new discoveries to be five or even ten years old before they are included in new editions of standard textbooks. Therefore, the medical journal holds a unique place in medical education. In this country, there are two main types of medical journals: one often spoken of as the organization journal; the other as the independent journal. The organization journal derives its name from the fact that it is owned and operated by a medical society or association, such as a county or district society, a state or a national association.

The outstanding example of journalistic excellence in this group is the *Journal of the American Medical Association,* founded in 1883 by Nathan Davis, edited from 1899 to 1924 by George H. Simmons, and since 1924 by Morris Fishbein. Purely through merit, this journal has made magnificent progress, which has placed it far ahead of any other organization journal. The *Journal of the American Medical Association* is published weekly, and reaches the desks of almost 100,000 physicians. Its frequent appearance makes it possible to keep the medical profession up to date. This journal has also added radio service through its editor, thus affording the members of the medical profession an opportunity to possess the very latest information at all times. Such a service is of exceedingly great value at critical times in the nation's health; for example, when great epidemics threaten to

spread throughout the country. There can be no doubt that through the radio and the pages of the *Journal of the American Medical Association,* cases of amebic dysentery emanating from the Chicago epidemic were diagnosed by local physicians long before this disease would otherwise have been suspected and before there was much chance for contamination of others. The business management of this journal has been very successful. Through selected advertisements, subscriptions, etc., funds have been made available to carry out an excellent editorial policy and to publish a large number of outstanding clinical and scientific articles each year. Largely because of the great success of the *Journal of the American Medical Association,* a number of component organizations have taken on the responsibility of owning and operating their journals. Some of them produce bulletins, which appear monthly or less frequently; others, well prepared and fine appearing journals. These bulletins and journals publish, for the most part, papers presented before regular meetings of the organizations which they represent. They often have a contract with a regular publishing house for putting out the bulletin or journal. The medical organization's chief work is to provide an editorial board, which arranges for the material, such as papers and editorials, which is to be published and which is transmitted to the commercial publisher.

The so-called independent medical journal may be operated on the same basis as the organization journal, but is not owned by the organization; that is, it is not published by a medical society. Usually, it is owned by one man or a group of men who have entered the business of publishing or are well-established publishers. Their publishing business may not be limited entirely to the medical journal which they publish. Such journals seek their revenue through advertising and subscriptions. They have editorial boards consisting of physicians who are chosen or elected from time to time. The business management, printing and everything aside from the preparation and selection of medical articles, editorials, etc., is left to the concern, which makes publishing a business. A good example is the *American Journal of Surgery,* which, although it is the official publication of the American College of Surgeons, is privately owned by men engaged in the publishing business.

Most of the American groups of specialists are provided with special journals devoting their pages to articles within the specialty, such as the *American Journal of Diseases of Children, Archives of Pathology, Archives of Neurology and Psychiatry* and the *Archives of Dermatology and Syphilology.* The great danger of specialization is that the physician limits his reading and interest entirely to one field. The *Journal of the American Medical Association* is of great aid to such groups because it deals with all phases of medicine. The place of the medical journal in medical education is unique. "Its greatest asset is its up-to-the-minute and timeliness features, which, when reinforced by its lower cost, accessibility and possibilities for permanence, make it the most important means of disseminating medical education."

Osler said: "There are many problems and difficulties in the education of a medical student, but they are not more difficult than the question of the continuous education of the general practitioner. Over the one we have some control, over the other none."

Hence, the most important part of medical education is that which interests the practitioner, since medicine is not a static but a living and growing science

which advances continuously. The problem then evolves into acquainting the general practitioner and specialist alike with the results of this growth through the findings of numberless research workers and clinicians.

Obviously, it is beyond the realm of physical possibility for the busy general practitioner to read all of the special medical journals, as well as those of a more general nature. There are so many of them, in fact up to January, 1913, there were more than 600 medical journals in America. While it is true that some of them were of brief duration, each one has or has had its use in some particular locality or as subserving the interest of some theory or sect. Even in the latter group, there is the occasional good article. Brief abstracts of as many good articles as possible are presented in the *Journal of the American Medical Association,* the *American Review of Tuberculosis* and elsewhere. These abstracts have been of great service, since they permit physicians to keep quite well up-to-date with the expenditure of a minimum amount of time in reading.

Other ventures which seem to have considerable merit have consisted of preparing very short, interestingly written and newsy articles from the scientific and clinical papers which appear in regular medical journals. Just a few lines concerning an article will often enable the reader to determine whether it contains any material in which he is interested. Again, a few lines will often suffice to acquaint the general practitioner and the specialist with what is being done in the various fields of medicine.

Today, no progressive physician opposes the dissemination of medical information, since the day of secrecy, mystery and medicine men has definitely passed. This new attitude toward the laity has opened up the field of popularizing medicine so that such a magazine as *Hygeia* has a very wide reading public. We are all familiar with the excellence, clarity and good news sense that characterize this periodical. A further tie between the public and the medical journal is made through the interpretation of medical advances originally reported in medical journals in the popular current news magazines. Even the Sunday supplement of the daily newspaper has entered this field, and while their reporting of the discoveries and advances are in a more spectacular manner, their access to the general reading public makes them an important outlet in a campaign of education along medical lines.

As for the material published in strictly medical journals, a set of standards in accordance with the tenets of the medical professions prevails. Papers on medical research make up the bulk of the material. Clinical observations and treatments command a large share also. Discussions on ethics, fees and every phase of medicine that affects the active practitioner are of interest. Their timeliness and the fact that they feel the pulse of the public on questions of public health are important factors in these medical articles.

All of the subjects mentioned, when written of in as simple terminology as the material permits, are of genuine value to a medical journal and find acceptance awaiting them at the discretion of the editor or editorial board.

Medical journalism is playing an inestimable part in keeping us all abreast of the times. It is rendering an invaluable service to our patients, who make up the general public, and as long as present standards are maintained, it will continue to serve both physician and public alike. In fact, the future outlook of this type of literature is broadening and deepening yearly.

ADVERTISING IN DENTAL JOURNALS*

By JOHN OPPIE McCALL, D.D.S., New York City

ONE of the enjoyable and, I believe, desirable features of the Dental Editors' Club has been its informality, its lack of a stereotyped program. For that reason, I hesitate to call this paper a presidential address; nor do I wish to suggest that its presentation is to be considered a precedent which may ensnare those who are to follow me in the office which I now have the honor to hold. I need hardly tell those who are gathered here of the deadly character of the average presidential address, whether it be delivered by one who may have a genuine message to set forth or by one who, having no world-saving formula to present, must nevertheless fulfil the unyielding demands of society constitutions and society customs.

As it happens, I feel that I have a message on a matter which is of vital concern in our profession, the matter of advertising in our dental journals.

When periodicals first were published, the matter of chief concern was the character of the reading pages, and the periodical was judged by the standards set in those pages. As time went on, the value of the periodical, whether as a news publication or one devoted to literature, science, or what-not, and the place of the journal in public esteem were determined to a very definite extent by the character of its advertising pages.

It is not necessary to quote examples to point my statement. All of you have seen, even if you have not read, journals whose standards are obviously low and whose status is inevitably fixed by the unworthy character of the advertisements which they carry. On the other hand, you are all familiar with both magazines and newspapers whose character is above reproach and whose high estate is attested in part by the character of their advertising pages.

Please do not assume that I am putting advertising above editorial matter as the criterion by which we are to judge our journals. The editorial and literary pages are, of course, the thing that make the publication. But it is a strange phenomenon, a fact, in spite of its apparent paradox, that the advertising and reading pages in any journal tend to show a high correlation of character.

In dentistry, we have been passing through an era of journalism in which there has been an ascendency of the commercial. That is to say, the only journals which were able to maintain themselves were financed by dental trade houses. These concerns, needing a medium for advertising their wares direct to the dentist, endeavored, very naturally, to make their business messages attractive to the profession and, to that end, established journals which carried scientific articles as well as advertising. In order that these articles might be adequately presented, the owners of the journals enlisted the services of eminent and capable dentists as editors. So well did some of

*Read before the Dental Editors' Club, Aug. 4, 1934.

these men conduct the editorial pages of their journals that these publications attained a high place in the esteem of the profession.

With the rise of the editorial pages in reader interest went a corresponding rise in the value of the advertising pages, and this created an inevitable conflict between the editor and the business manager of these publications. The tradehouse dental journal had now become not merely an advertising medium for the goods manufactured by its sponsor, but also a business enterprise in its own right. In the latter capacity, although possibly in the former also, it became financially important that the journal print as much advertising as it could bring under contract. And as might easily have been expected, some of this advertising, for one reason or another, merited the disapproval of the editor. Yet it could hardly be expected that a journal, commercially sponsored, would permit editorial opinion to enforce decisions which would diminish advertising income.

This conflict is, of course, not peculiar to dental journalism. It exists in varying degree in the organization of virtually every publication which carries advertisements. And editors are influenced in varying degree, according to their own character and according to the balance of power between the editorial and business staff as established by the owner. Dentists who have edited journals put out under commercial auspices have, on the whole, been men of high ideals and great ability, but it is evident, on analysis, that they have not always had the degree of control over advertising pages that was desirable. And that is one reason, although not the only one, that dentistry has had to establish journals which would be solely under the control of the profession.

I quote from my discussion of Dr. Best's paper, read before the Dental Editors' Club last year:

> The existence of society journals of adequate strength is, however, absolutely essential to enforce a high quality of non-society journalism. It is but human nature for a commercial organization to look for profits. And it is undoubtedly true that the presence of high-class society journals in the field will wield a definite influence on commercial journals, checking any tendency to let down the bars too far as regards advertising and editorial discrimination. Furthermore, true independence in the editorial pages cannot be expected in a journal whose owners are interested in showing a profit for their efforts.

What are some of the difficulties centering in the problem of advertising in dental journals?

First, there is the matter of misrepresentation. Therapeutic preparations, for instance, have been put forth with claims that they are germicides, that they will prevent decay or pyorrhea, that they will cure pyorrhea and Vincent's infection. When they have not openly asserted these things, they have implied them so strongly that their statements would constitue a virtual assertion.

Amalgam alloys, alloys for casting and various other materials used in prosthetic and operative dentistry have been placed before the profession with claims which could not be scientifically substantiated.

Obviously, what is needed is a scientific fact-finding body which will investigate all products offered to the profession and certify those whose claims are within the bounds of reason and probity. It is difficult to establish a body of this type which will function in an ideal manner. A board such as our Council on Dental Therapeutics must depend in certain of its rulings on professional opinion, and this may be divided, or, even if united, it may be in error. The principle involved in such bodies as the Council is sound. And while

we may not all accept the rulings of such a board to the extent that we permit them to govern our advertising policy *in toto*, they provide an excellent yardstick.

Whether we choose, for example, to limit our advertising of dentifrices, etc., to those accepted by the Council on Dental Therapeutics, we can at least set and apply a standard which will be so high as to exclude dentifrices and mouth washes making claims which the profession as a whole agrees are not likely to be fulfilled. And so it goes for all products whose manufacturers may seek to present them to our readers through our advertising pages.

We must remember that we have a responsibility to the profession, assuming, of course, that each of us is attempting to put out a journal that shall merit the approval of the great mass of the profession. Our readers, consciously or unconsciously, expect us to present advertisements of worthy products only. The presence of an advertisement of a product in the pages of a reputable journal should be evidence to the reader that that product has been carefully tested by disinterested persons and that, within the limits of human error, it can be certified as measuring up to the claims of its manufacturer.

Not only are we interested in the claims of the manufacturer: There is much to be said as to the manner in which those claims are set forth. Flamboyancy is objectionable; equally so is the lack of reasonably good literary form. Our advertising messages are addressed to educated professional men and should be couched in the language of science.

Advertisers often fall into the error of presenting too much material regarding their product. This may not only defeat their own purpose, but it also definitely lowers the standards of the journal. Advertisements camouflaged as instructional messages fall in this same class. Discourses on office management which are intended to serve as sales talks for equipment are examples of this type of advertisement.

The location of advertisements in the journals has much to do with the impression created by the journal. We cannot unthinkingly follow the lead of many lay magazines and interlard advertisements with reading matter, simply because the aforesaid lay magazines are widely read and the juxtaposition of text and advertisements in their pages is accepted by their readers. We are conducting professional journals and should set and maintain the highest standards of format, text arrangement, etc. I do not believe that, in a professional journal, there is any decided advantage to the advertiser in having his "ad" next to a scientific article. If the reader approves the journal as a whole, and if the advertisements are so written and presented as to merit attention, he will read them, no matter where they are located. On the other hand, the reader who must get his scientific reading, if he gets it all, by skipping from page to page, is likely to be at least subconsciously irritated by the difficulties thus imposed.

If I have said anything which may appear to be a personal criticism of any member of this Club, I regret it. Such has not been my intention. I do believe that an organization like this, gathering its membership from several different sources, may profoundly influence the development of dental journalism and lead all types of dental journals to higher planes. Naturally, this cannot be accomplished without some taking of stock. And I believe that it is much less painful and more effective if criticism comes from the inside rather than the outside.

A REVIEW OF INLAY CASTING TECHNICS*

By HERBERT D. COY, D.D.S., Hamburg, Iowa

IN introducing this discussion, I wish to pay tribute to all those who have contributed in any way to the improvement of the gold inlay, giving full credit where it is due for the facts used in the writing of this paper.[1]

The realization that the dental profession needed to become better acquainted with the materials used in the casting process led, in 1929, to the experiments carried on by the National Bureau of Standards, with its cooperating committee of practicing dentists.

Dentistry is moving rapidly forward, making more progress than ever before. It has gained more ground in the last decade than in any previous one.

So, while in the past we have had those who were highly proficient in the casting of gold, we must progress. Progression means discarding a good thing when we have found a better.

In 1910, C. S. Van Horn[2] introduced a compensating casting technic. Further progress was made possible only when the National Bureau of Standards established a standard for the materials used, making the results obtained much more accurate than those of 1910. Thus, it may be seen that Dr. Van Horn was thinking far ahead of the inlay workers of that time, and we are using some of his original ideas in our present-day methods of casting.

In THE JOURNAL of February, 1933, he says of the recent research work:

> . . . until very recently, judging by the progress reports, there has been very little effort made in calling to the attention of the profession, the established and important fact that mouth conditions are vastly different from laboratory conditions; hence, the futility of adhering to a technic, which has been established by adapting a wax pattern to a steel die, at average room temperature, in the hope that this technic will result in a casting which will fit the tooth *in situ* as it does the steel die in the laboratory.[3]

Observation, from personal contact, has led me to conclude that a large majority of the practicing dentists in the United States are still using casting technics which do not take into consid-

*Read at the Seventieth Midwinter Clinic of the Chicago Dental Society, Feb. 27, 1934.

1. Taylor, N. O., and Paffenbarger, G. C.: Survey of Current Inlay Casting Technics, J.A.D.A., 17:2058 (Nov.) 1930. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Dental Inlay Casting Investments: Physical Properties and a Specification, J.A.D.A., 17: 2266 (Dec.) 1930. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Specification for Inlay Casting Wax, J.A.D.A., 18:40 (Jan.) 1931. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Specification for Dental Impression Compound, J.A.D.A., 18:54 (Jan.) 1931. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Inlay Casting Golds: Physical Properties and Specifications, J.A.D.A., 19:36 (Jan.) 1932. Volland, R. H., and Paffenbarger, G. C.: Cast Gold Inlay Technic as Worked Out in the Cooperative Research at the National Bureau of Standards and Applied by Group of Practicing Dentists, J.A.D.A., 19:185 (Feb.) 1932.

2. Van Horn, C. S.: Review and Commentary, Including Technique, D. Cosmos, 52:873-881 (Aug.) 1910.

3. Van Horn, C. S.: Casting Technics, 1910-1930, J.A.D.A., 20:219 (Feb.) 1932.

eration the fundamental principles set forth in the foregoing quotation.

In this paper, I shall consider the problems to be encountered and how they can be met and overcome, together with the results to be obtained by the use of different materials and technics, and my reasons for thinking that the one worked out by C. E. Woodbury and me, which was presented for the first time at the Midwinter Meeting of this society in 1932,[4] is the most logical, and in every respect the most simple, cast gold inlay technic that has been established.

Following the completed research on inlay casting technics and materials, many technics were brought out with claims of superiority for casting to dimension and setting forth numerous other advantages. Many of these were sound in their principles and many were not.

Taking all these things into consideration, this fact remains: With the materials that we have at our disposal at the present time, we do not now have, nor is it possible for us to have, a completely controllable method by which we can always cast to actual dimension.

Overemphasis has been placed on the data obtained on dental materials. Many writers have assumed that they can make castings which will fit within 0.001 per cent. It is scientifically impossible to approximate anywhere nearly constant results approaching this type. Minor variations within a given amount of material, in temperature ranges, and in weights, and numerous other variations, will cause appreciable shifts in casting sizes, over which no technic yet described has complete and accurate means of control.

A good pattern having been achieved, the completion of a good inlay is dependent on compensation for the shrinkage of the gold used and the change in the size of the wax pattern when subjected to the change from mouth temperature to room temperature.

Because my own technic has been quite thoroughly covered in former papers,[5] and since there have been no new developments which would fundamentally change the principles involved, I must of necessity draw freely upon them in presenting it for your approval.

CAVITY PREPARATION

It will not be necessary to discuss cavity preparation at length. A cavity with a flat seat and definite angles is much to be preferred.

A much softer gold may be used in a box-shaped cavity than in a slice preparation. It would seem that we have not stressed enough the use of the softer golds in inlays and that we should seldom use hard gold except for abutments, and then the case in which it is used should be frequently checked for traumatic stress.

Every cavity from which a wax pattern is to be drawn should be thoroughly planed and smoothed with sharp chisels and stones, and the cavosurface angles definitely and painstakingly beveled. The bevel should be long enough in all cases to completely eliminate all the short enamel rods.

In the making of an inlay, no one step can be said to be more important than another. Every one must be faithfully executed, if the finished product is to approach the ideal.

WAX PATTERN

Failure to understand the physical properties of inlay wax, and the use of faulty patterns in inlay construction, are among the chief conditions responsible for so many ill-fitting inlays. An inlay

4. Coy, H. D.: Inlay Casting, J.A.D.A., 19: 1760 (Oct.) 1932.

5. Coy, H. D.: Recent Developments in Inlay Casting, J.A.D.A., 20:212 (Feb.) 1933.

wax should meet the specifications of the American Dental Association. The waxes that have been certified to meet this specification are: Brewster, Maves, Kerr blue-hard, Peck's blue and Peck's purple.

It should be heated to an even consistency, then forced into the cavity and held under pressure until it becomes rigid. Closing the teeth in centric relationship does not bring about enough pressure. Therefore, little attention is given to the bite until the wax is carved to form, after which the bite is correctly adjusted. The pattern should be held stationary during the carving.

After the excess wax has been carefully removed and the pattern burnished with instruments and polished with silk tape, it is wiped clean with a pledget of cotton which has been dipped in warm water.

As any additional handling presents some new variables, whenever possible the sprue should be attached in the mouth. It requires just so much heat to accomplish this, and distortion is less likely to occur than if the pattern is removed with an explorer and the sprue attached outside the mouth.

A small bead of sticky wax may be placed on the wax pattern at the point where the sprue is to be attached, or on the sprue itself, so that it will adhere without the use of excessive heat. Simultaneously with the touching of the heated sprue to the wax pattern, a cotton pellet, previously moistened in cold water, may be applied to the sprue, to carry away the excess heat. Then, there will be no distortion of the pattern.

After the pattern is removed from the cavity in the mouth, it is washed with a solution composed of equal parts of hydrogen peroxide and tincture of green soap, rinsed with room temperature water, and dried with an air syringe. The use of peroxide of hydrogen with the green soap seems to clean the pattern better than the use of soap alone, as the peroxide cuts the mucin from the wax.

The pattern is now ready for investing, which should follow immediately.

THE SPRUE

Since the molten gold flows to the mold through the opening created by the removal of the sprue wire, it is important that consideration be given to the type and size of the sprue.

1. It should be the same diameter throughout its entire length, since if it tapers toward the pattern, it will restrict the flow of gold. If it tapers toward the sprue former, it cannot be removed from the investment.

2. It should be short (not over one-third inch between the sprue former and the attached pattern). The shorter the distance over which the molten gold has to flow to reach the mold, the less likely it is to freeze on the way, a faulty casting resulting.

3. The diameter should be chosen according to the size of the pattern, but it is recommended that in no case should a sprue smaller than 18 gage be used.

INVESTING

It was expected that, on the completion of the recent research, several compensating casting technics would be developed which would enable the profession to achieve approximate accuracy in this phase of operative dentistry.

I shall discuss under this heading the principal methods for investing a wax pattern, pointing out their relationship to each other. Satisfactory castings can be made by each method, if strict attention is given to the controllable variables.

This analysis is not intended as criticism. The members of the profession

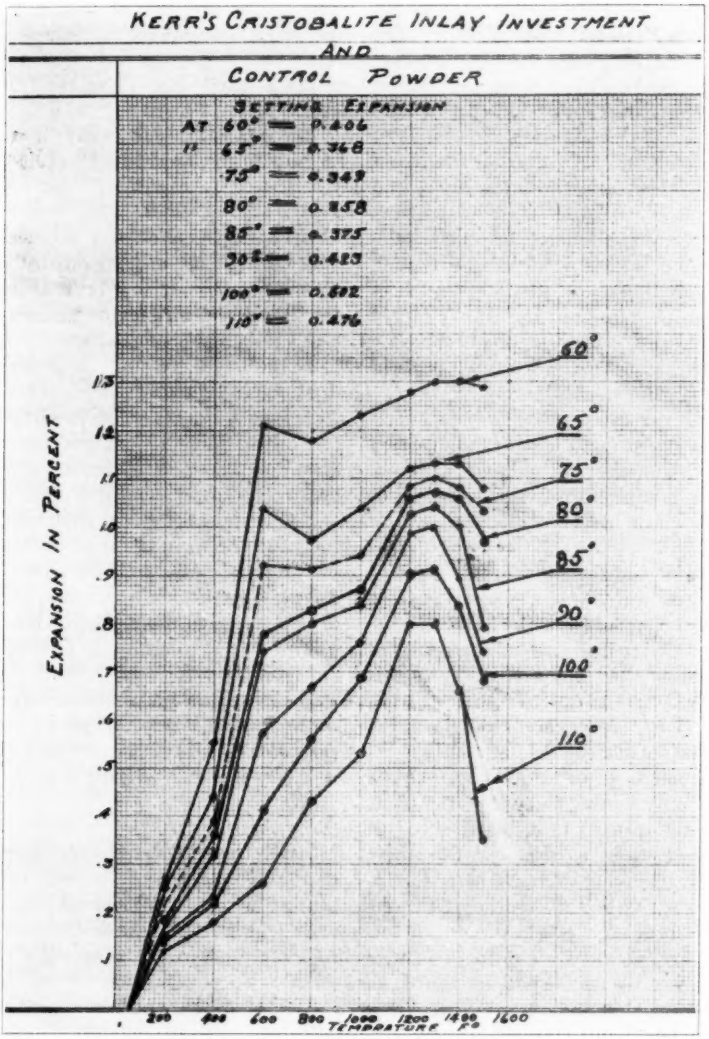


Fig. 1.—Expansion of Kerr's cristobalite inlay investment and control powder.

who have contributed to these developments deserve unstinted praise for their untiring efforts. It is hoped, rather, to make a comparison so that still more workers will strive for greater accuracy in this field of endeavor.

The principal methods of investing involve:

TEST NO.

NATURE OF TEST 250 Grams Cristobalite and Control Powder weighed

SHEET NO.

APPARATUS on automatic scale at 85°, Mixed inMechanical Spatulator

DATE Jan. 25, 1934.

MATERIAL DETAILS 50 Turns, Top 50 grams and Bottom 50 grams Used For Test.

OBS'R.

	No. 1.		No. 2.		No. 3.		No. 4.	
Temperature	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
100	0.060	0.035	0.055	0.040	0.030	0.065	0.060	0.070
200	0.120	0.110	0.160	0.140	0.140	0.150	0.160	0.190
300	0.265	0.175	0.245	0.175	0.190	0.205	0.245	0.240
400	0.335	0.230	0.330	0.225	0.255	0.225	0.300	0.250
500	0.600	0.595	0.635	0.395	0.385	0.600	0.530	0.660
600	0.750	0.650	0.735	0.685	0.665	0.680	0.735	0.740
700	0.820	0.700	0.775	0.720	0.730	0.745	0.790	0.795
800	0.855	0.720	0.825	0.730	0.755	0.765	0.830	0.825
900	0.835	0.725	0.830	0.680	0.755	0.760	0.835	0.785
1000	0.890	0.770	0.875	0.750	0.825	0.800	0.870	0.825
1100	1.045	0.890	1.020	0.935	0.950	0.965	0.975	0.970
1200	1.080	0.925	1.060	0.975	1.000	1.010	1.065	1.030
1300	1.090	0.935	1.075	1.000	1.015	1.030	1.090	1.045
1400	1.090	0.920	1.080	0.985	0.995	1.030	1.050	1.025
1500	1.090	0.790	0.995	0.880	0.915	0.925	0.900	0.910
Max. Expan.	1.090	0.935	1.075	1.000	1.015	1.030	1.090	1.045

No. 4 was mixed dry for ten minutes before making the test.

Fig. 2.—Results in cristobalite and control powder test.

1. The use of investment having moderate expansion, the water bath acting as a temperature stabilizer.

2. The use of an investment having high expansion, with a control powder as a stabilizer.

3. The use of the hydroscopic method of obtaining compensation as a setting expansion.

In the first classification are all of those moderately expanding investments which have been certified to the Research Commission of the American Dental Association as meeting specifications, and which

have more than enough setting and thermal expansion to compensate for the deficiencies caused by the shrinkage of wax and gold.

This group includes Ransom & Randolph's green, Ransom & Randolph's gray, Coe inlay, Coe universal and Kerr No. 3.

Classed as high expanding investments, which have much more setting and thermal expansion than is needed for ordinary compensation and which have been guaranteed to the American Dental Association as meeting their requirements are: Ransom & Randolph's X 45, Kerr cristobalite inlay, and Kerr cristobalite model.

Since I wish to describe a definite technic under the first classification, I shall choose Ransom & Randolph's green investment from the list named, although any of them may be used, with slight allowance for water-investment ratio and a variation of the expansion curve.

A mix of investment is made, with 15 gm. of water to 50 gm. of investment for full crowns, large posterior three-quarters, and large mesioclusodistal and simple occlusal; then 16 gm. of water to 50 gm. of investment for patterns of the mesioclusal type and 17 gm. of water to 50 gm. of investment for anterior three-quarter crowns; etc. The water and the investment should be accurately weighed on a set of gram scales. The amount of setting and thermal expansion depends largely on the ratio of water and investment, together with the thoroughness of the spatulation.

To facilitate the operation, the water may be weighed out and placed in individual bottles with tight screw caps. The investment may similarily be placed in cartons ready for use.

The correct amount of both water and investment is placed in a clean, dry plaster bowl and first spatulated by hand, then by a mechanical spatulator for about 300 turns of the blade, which is about 100 turns of the handle, or about fifteen seconds, if an electrical spatulator is used.

Spatulation eliminates the minute air pockets from the investment and makes a smooth dense mass, which is very necessary for even expansion and smooth castings. It is then vibrated to remove any remaining air, then placed in a ring which has been previously sealed to a metal slab with beeswax and lined with sheet asbestos, this lining having been moistened with water, the operator carefully avoiding any excess, so that the water content of the investment will remain the same. This procedure also provides an expansion cushion, which permits the setting expansion to take place horizontally.

The ring is vibrated full of investment, more of which is formed on the pattern with a camel's hair brush, the investment being forced ahead of the brush to avoid trapping any air between the investment and the pattern, which is now gently vibrated to place in the investment-filled ring.

The invested ring is now placed in a water bath and kept there until the investment has set. This is not done to produce wax expansion, but to stabilize the temperature of the wax pattern at a given point, so that the needed amount of setting and thermal expansion may be accurately computed.

The combined setting and thermal expansion of the investment should equal the 1.25 per cent shrinkage of gold plus the shrinkage of the wax to the size established by the water bath.

Owing to cooling of the mixed investment, because of the evaporation of water from the mix, and the tendency of the bowl and spatulator to assume tem-

peratures much below that of the room, it is very difficult to determine the temperatures of a given mix of investment. Since different levels and parts of a room may vary a number of degrees, it is not easy to find room temperature.

A finished mix of investment often registers from 5 to 20 F. below the temperature of the room. It is necessary to stabilize the temperature at some given point, if consistent results are to be obtained, since the size of the wax pattern when removed from the mouth is governed by the temperature of the atmosphere immediately surrounding it. This can be better accomplished by a water bath than by any other method.

Theodore W. Maves, writing on wax distortion[6] in THE JOURNAL, says, "All inlay waxes, when subjected to change in temperature become distorted, varying in this respect in proportion to the heat applied."

The tendency of wax to distortion is very great, and every precaution should be taken to minimize this danger, although the Bureau did not find this to be a serious enough variable to preclude the use of the water bath as the best method of temperature stabilization.

Wide ranges of temperature will undoubtedly distort wax to an appreciable extent, but the range necessary in the use of a water bath is very short, and therefore little or no distortion is possible. A water bath need not be expensive or thermostatically controlled. A heavy aluminum cooking utensil with a thermometer attached makes a very convenient and satisfactory water bath. An investment can be regulated to make one equally good by means of a water tray in which a small electric bulb has been placed.

It would seem that perhaps the sealing of both ends of the ring would not permit the normal range of setting expansion, but since this accommodates itself against the walls of a large inlay pattern, it surely must exert its normal action against the metal ends, which are sealed with beeswax, because no distortion has ever been noted as a result of this procedure.

ELIMINATION

After the investment has set, the metal slab, the sprue former base and the sprue pin are removed. The ring is then placed in a furnace, and very slowly heated at first, the temperature being gradually increased until a dull red (1300 F.) is visible through the sprue hole.

Several reliable furnaces are now on the market which have accurate heat registration and control. An open gas flame may be used if no furnace is available, although one is much to be desired for accuracy and convenience.

The casting should be made at the point when a dull red is visible through the sprue hole, as most high heat investments shrink rapidly if carried very far beyond red heat.

USE OF CRISTOBALITE INVESTMENT AND CONTROL POWDER

This method, outlined by D. W. Phillips,[7] is one of the better methods of investing in use today, although its simplicity and accuracy would seem to have been overestimated. The use of the water bath as a stabilizer presents only the possibility of a slight distortion of the wax pattern, if the process is carried to extremes, although the slight range necessary in the water bath cannot produce more than a minute discrepancy, while there are several possibilities of error in the use of control powder.

6. Maves, T. W.: Wax Distortion, J.A.D.A., 19:606 (April) 1932.

7. Phillips, D. W.: Use of Cristobalite and Control Powder, D. Digest, 39:72 (Feb.) 1933.

1. There is a great difference in the amount of water used to produce a consistency mix with cristobalite and control powder. Cristobalite investment requires about 40 c.c. of water to 100 gm. of investment, while Kerr control powder requires about 29 c.c. water to 100 gm. of powder. Because of this variation in the water required for each of these when mixed separately, it must follow that every different combination of cristobalite and control powder will have a different water consistency ratio.

2. Without the use of the water bath, there is never any certainty that the mixed investment is the same as that registered by the thermometer which hangs on the wall in the laboratory.

3. The automatic scales recommended for use with cristobalite and control powder are subject to considerable inaccuracy, it being possible to balance the scale at 85 degrees with 23.06 gm. of cristobalite or with 19.01 gm., this depending on which side of the cup the powder was piled.

4. Thermal expansion tests taken from resultant mixes of control powder and cristobalite prove that these powders do not make a uniform mixture when spatulated wet in the ordinary fashion with a mechanical spatulator for fifty seconds.

Figure 1 shows the results of four such tests in which 250 gm. of cristobalite and control powder was weighed on the automatic scales at 85 F., mixed in the mechanical spatulator for fifty turns. The thermal expansion of the top 50 gm. and the bottom 50 gm. was taken every hundred degrees Fahrenheit; which shows considerable inconsistency in the mix.

Figure 2 shows the irregularity of the control powder curve. Cristobalite expands quite rapidly to 800 F., when the curve flattens out rather definitely up to 1600 F., which makes it possible to cast at nearly any point between these two temperatures, with considerable dependability. The addition of the control powder shortens this range in some cases to less than 100 degrees; which makes definite heat control imperative for any degree of accuracy.

HYGROSCOPIC INVESTMENT EXPANSION

This method, recorded by C. H. Scheu,[8] obtains an expanded mold by placing an investment-covered pattern in a water bath approximately at the time of the initial set. The compensation is obtained entirely as a setting expansion.

The discovery by Dr. Scheu of the hygroscopic properties of investment was one of real significance from a scientific standpoint and a property of which little was known before. It is one which, if properly handled, can be used to produce accurate and successful castings.

This technic, which has not been very widely adopted because of the difficulties and variables involved, depends entirely on the initial setting time of the investment.

Manufacturers of investments have not found it practical to try to limit the initial setting time of an investment to a time of less than about two minutes' maximum variation when the material is made.

Also, it has been proved by experience that any investment, on standing, whether or not in a sealed container, will change as to setting time, which is usually lengthened. Since this technic depends on a known and definite setting time, in order to produce definite expansion, it would be necessary to determine the setting time of the investment about once a month and then adjust the technic according to the setting time.

The amount of setting expansion pro-

8. Scheu, C. H.: Precision Casting, J.A.D.A., 20:1205 (July) 1933.

duced by this method seems to depend to a considerable extent on the amount of investment used and the way in which it is spatulated.

Even though the setting time for an investment was held by the manufacturers to be within one-half minute when the material was made, within six months the setting time might vary from the original as much as two or three minutes.

DIFFERENT TYPES OF WAX PATTERNS

As setting expansion of the investment is utilized in all three of the technics described, it is well to consider this phenomenon and its effect on various types of wax patterns.

An occlusal wax pattern has no cross bar or inner core, and so offers no resistance to the setting expansion of the investment.

A mesioclusal or a distoclusal crown offers little resistance, while a mesioclusodistal or full crown pits the strength of the wax directly against the strength of the investment setting expansion to a point beyond the amount necessary for other types of patterns.

CASTING

Any of the standard casting machines is chosen and casting is done immediately on removal of the ring from the furnace so that no shrinkage of the mold can possibly occur owing to loss of heat therefrom.

There are many golds which meet the requirements of the A.D.A. Specification No. 5 of the A.D.A. for inlay golds should be consulted.

CONCLUSION

It has been my intention to give a summary of the work already done pertaining to gold inlays. If we will but apply the same amount of study and effort to the mastery of an up-to-date gold inlay technic that we have applied to other operative procedures, we will not be long in acquiring the necessary skill. Let him who has a desire to render a more complete and better service to his patients apply himself and master one of these technics and he will find much joy and a sense of satisfaction in the doing.

THE MORE PROGRESSIVE ACTIVITIES OF THE A.D.A.*

By MARCUS L. WARD, D.D.S., Ann Arbor, Mich.

I AM pleased to give you what appear to be the most important things that transpired at the meeting of the American Dental Association at St. Paul, for it has been a policy of recent administrations, and is of the present one, to have the Trustee in each of the thirteen districts represent the administration whenever it seemed desirable.

In the absence of immediate relief from encroachments upon what have heretofore been regarded professional privileges, relief from financial distress, and from other things, the profession has been too frequently inclined to designate the A.D.A. as a large political organization

*A statement addressed to U. G. Rickert and prepared at his request by Dr. Ward for publication in the Journal of the Michigan State Dental Society (October, 1934).

without definite objectives in the interests of the profession and weak in its endeavors to achieve them. This has probably been due more to lack of information than to anything else, for the dental profession has been noted among the professions for years for its pull-together spirit. It is to assist in the dissemination of information about the activities of the A.D.A. that recent administrations have concerned themselves with modifications of the organization, so that every Trustee would be an actual rather than a nominal representative of the Association's activities.

It would seem that the size of the A.D.A. and the magnitude of its activities, as judged from the amount of business that passes through the Board of Trustees and is done by the President, kept the average dentist in the position of one who could not see the forest because there were so many trees. The budget for this year is approximately a quarter of a million dollars, involving twenty-seven different appropriations ranging in size from fifty dollars for the National Museum Committee to eighty-six thousand for THE JOURNAL. The time consumed in the consideration of the requests of these bureaus, boards and committees is so great as to make it almost impossible for a trustee to attend a professional session. Beginning on Friday previous to the opening of the meeting on Tuesday, the Trustees are obliged to begin their consideration of the needs of the different branches of the Association in order that the budget may be presented to the House of Delegates for consideration before the last meeting of this body on Thursday.

It seems impracticable to discuss all of the activities of the Association and, likewise, it seems impracticable to discuss in much detail those which will be mentioned. Those which are left out of consideration here, therefore, are not left out because they are not important, but because it is possible to discuss only the most outstanding and far-reaching ones. The most important activities of the Trustees and Delegates at the St. Paul meeting in the interests of the profession were probably about seven in number, as follows: economics, education, legislation, insurance, relief, junior membership and Council on Therapeutics and Bureau of Standards.

ECONOMICS

In order that the various activities in the different parts of the country relating either directly or indirectly to the economic situation caused by the depression, the curtailment of the use of gold, the governmental codes, and the encroachment of state and insurance dentistry might be correlated for study, the Trustees recommended to the Committee on Amendments to the Constitution and By-Laws that a standing committee on economics be provided at once. The House of Delegates acted upon the amendments presented, which provide that each Trustee district shall have one representative on the Committee and the United States Public Health Service one representative, making a total of fourteen members. The amendments also provide that the Trustees shall designate a chairman and executive committee and provide a secretary in the main offices of the Association at Chicago. The ninth district, which is composed of Wisconsin and Michigan, has for its representative this year Dr. M. W. Prince of Detroit.

It would be wholly impracticable to discuss all of the factors considered by the Trustees, the Committee on Amendments and the Delegates which have brought about provision for this standing committee. It is hoped, however, that its need is obvious and that all interested in any phase of economics will communicate with the representative in his district.

EDUCATION

There have been numerous attempts to consolidate some of the educational activities of the profession since Dr. Gies urged the union of the two faculties' associations at the beginning of the Carnegie Survey of dentistry between 1922 and 1926. There has developed quite a widespread feeling that the educational activities of the A.D.A., like the legislative, economic, and others, should be centered in the headquarters of the Association in Chicago, so that the Editor of THE JOURNAL and the Secretary of the Association could be utilized to disseminate desirable information to the profession through the regularly established channels of communication. Moreover, it is found that the professional activities of the A.D.A. will be not only more informative to the officers of the Association if located at Chicago and consolidated, but will also be administered at less expense. As a result of consideration of these problems, the Trustees recommended to the House of Delegates amendments to the Constitution and By-Laws providing for a consolidation of the standing committee on education and the representation which the A.D.A. had on the Dental Educational Council of America, and thereby took the first step toward the formation of a council on education similar to the one in the American Medical Association. Up to this time there was a standing committee on education in the A.D.A. and, at the same time, a representation of three members on the Education Council, the body that assisted the Carnegie Foundation in its survey and which rates the schools. Obviously, the standing committee on education was deprived of most of its legitimate activities on account of the activities of the Educational Council; when the Trustees met they were confronted with the perplexing duty of considering the work of two groups dealing with the same problems within its own organization. The steps taken at the St. Paul meeting to clarify the situation that had grown up with the A.D.A. are of far-reaching importance in the field of education.

LEGISLATION

In the matter of legislation, the profession is probably better informed on the activities of the A.D.A. than in many other matters which have cost the Association more money and required more attention than legislative matters have. The difficulties which the profession has had to show the impracticability of a code, the effect of the code upon the manufacturers of dental products and upon the laboratory organization, the restrictions placed upon the use of gold, and insurance dentistry have all been of sufficient interest to the profession to keep it alert to these activities. Few in the profession, however, have realized the handicap under which the officers of the Association often labored in their attempts to comply with the By-Laws of the Association which made it mandatory on the part of the Trustees to maintain a separate bureau of legislation. Under the former type of organization, it was difficult, even with the most cooperative group, for the Editor of THE JOURNAL and the Secretary of the Association to be informed on the activities of the Committee on Legislation as they should be. As a result of experience with this handicap, the Trustees proposed to the House of Delegates amendments which place the matter of legislation in the hands of the Trustees with freedom to organize the work of legislation on much the same basis as is contemplated for education in the headquarters at Chicago. These amendments were adopted and a different type of organization is possible after March 1, 1935. Until then, anyone having matters

pertaining to legislation which need attention by the A.D.A. may communicate with Dr. Homer C. Brown of Columbus, Ohio, who has had the position of director on the Committee on Legislation for several years.

INSURANCE

Whether it is advisable for an organization of the type of the A.D.A. to encourage insurance of the kind that is available to groups like the A.D.A. is not for the present Board of Trustees to determine; it is a problem which this Board inherited. From the amount of discussion that has taken place, it would appear that many of those who have discussed the matter do not realize the exact nature of group insurance. As a result, they do not appreciate the fact that low cost means some restrictions in the benefits. Probably nothing in the Association's business affairs has given the Board of Trustees more concern than this general lack of understanding about what the Association could and should do in regard to insurance. Added to a general lack of understanding about what could be expected from this type of insurance has been an apprehension about the ability of the company carrying the insurance to execute its part of the contract. This apprehension has been caused by advice from representatives of other companies to the effect that the contract existing between the members and the insurance company was unsound. During the last year the Board of Trustees has been giving special attention to this feature and has decided to change companies. In order to get a good company to take over the obligations of the old one, it has been necessary to correct the unsound features of the old contract which related to the rates for older ages. Instead of raising the rates for the older ages, which would have been necessary to make the old contract sound, the amount of coverage for the older ages has been reduced. Upon advice that appears to be as good as it is possible to obtain, this was the only sound way to get a good company to assume the obligations that existed between the membership of the A.D.A. and the old company. It is hoped that the membership will accept the assurance of the Trustees that their insurance is now in a sound company operating upon a sound basis, and that all that is obtainable under this type of insurance will eventually be, if it is not now, written into the master policy held by the A.D.A.

COUNCIL ON THERAPEUTICS AND BUREAU OF STANDARDS

From the general trend of the information that has reached the Board of Trustees, it would seem that the profession appreciated the funds expended upon these two activities. Anyhow, much favorable comment has been received and about the only criticism that has reached the Board has related to the publication of the list of unacceptable remedies. While this is only a minor part of the work connected with the operation of these two departments, the publishing of unacceptable remedies or materials is a matter upon which the Board of Trustees has centered its attention. Almost any manufacturer of a remedy or material would not object to the appearance of one of his products upon an acceptable list, but if his product appears upon an unacceptable one, he is likely to challenge the Council or Bureau. This feature of the work of the Council and the Bureau, while apparently to some a matter of minor significance, has given the officers of the Association more concern than all of the other features combined. If it should be found that either the Council or the Bureau had made a mistake, it would not only mean retrenchment from

the position taken, but it might also permanently weaken the position of both in future attempts to evaluate our remedies and materials for us. What appear to be adequate safeguards to the work of both the Council and the Bureau were organized at the St. Paul meeting and in the future the publication of unacceptable remedies will follow the publication of acceptable ones. In order to realize the full value of the work of the Council and the Bureau, it is essential that the profession purchase from the accredited lists of remedies and materials. Otherwise, there is no incentive on the part of the manufacturers who cooperate with the A.D.A. to get their products on the accredited lists. While, undoubtedly, it has been desirable in the past to know the unacceptable as well as the acceptable remedies and materials, it should be understood that large numbers of remedies and materials are not worth the time and energy of a competent staff. What is most essential to the success of the work of both departments is that every dentist inquire of every salesman whether his product is on the accredited list.

RELIEF

During the year, numerous requests for relief have been received and some have taken the position that the component societies should not be required to contribute an equal amount with that granted from the relief fund of the A.D.A. These requests and suggestions have been given much consideration along with the consideration given to the matter of insurance and economics. The result has been an attempt on the part of the Trustees to modify the plan of distribution so that the local society would be required to appropriate one-third and the A.D.A. two-thirds of the amount of relief granted. Last year, the Board of Trustees suggested this plan to the Relief Committee, but so many objections based upon experience were presented by the Relief Committee that the Trustees were unable to bring about any modifications of the plan now in existence without further consideration. The Board of Trustees realizes the strength of the argument that money contributed to relief from a given state should be available for relief in that state, but, at the present time, no practical means of appropriating the money to the most needy and deserving has been presented except the one which involves a contribution from the society in the district in which the applicant for relief resides.

JUNIOR MEMBERSHIP

During recent years, attempts have been made to form dental societies in dental schools on much the same basis as they existed in a few places previously. Last year, the A.D.A. made its journal available to students at a price less than the actual cost of publication as an inducement to get students interested in dental society work. This year, a junior membership has been created, with dues at two dollars, and with no voting power in the A.D.A. Junior membership with the receipt of THE JOURNAL should assist to get students in society work. It will depend largely upon two things, however: first, the attitude of the faculties of the different schools, and second, the attitude of the profession in the vicinity of the school. If the faculties do their part and if the local and state societies invite the students and welcome them, the plan should work to the advantage of all concerned.

RECONSTRUCTIVE PLASTIC AND ORAL SURGERY*

By ARTHUR E. SMITH, M.D., D.D.S., Los Angeles, Calif.

TODAY, because of the keenness in competition in all forms of endeavor, more than at any other time in the world's history, it is necessary for each human being to be as nearly perfect physically and mentally as possible, in order to obtain a degree of success in the economic world. Competition for a chance to start in the business world, much less to maintain a position therein, is so keen that one handicapped by a physical deformity must show a prodigious mentality to be considered. Congenital or acquired physical defects may stand between failure and success. The victims of destructive disease or accident with their scarred lips or distorted or destroyed facial, nasal or oral tissues who remain secluded or semi-secluded from society often need only a little attention at the hands of a reconstructive plastic surgeon.

The responsibilities of the trained surgeon in restoring an unfortunate fellow-being to a normal chance of happiness in this life should not rest lightly upon his shoulders. In every community, there are many neglected persons in whom disease or injury has left an abnormality impairing some normal function. The well-trained plastic surgeon is a benefit to humanity, and he has a legitimate and well-defined field.

Many have incorrectly considered plastic surgery to be entirely a development of the recent World War. While the progress of reconstructive plastic surgery since that time has been great, literature reveals that successful plastic operations were carried out centuries ago. Attention was called to this fact in a paper read before the American Surgical Association in 1926, by John Staige Davis, plastic surgeon at Johns Hopkins University. Tagliacozzi (1597) was the first to write a book on plastic procedures, but there were earlier reports of plastic surgery of the face by Benedictus in 1492. The technic as described by Tagliacozzi remained practically dormant until the eighteenth century, when it was enthusiastically practiced by many surgeons who recognized the value of this highly specialized branch of general surgery. Since that time, we have had contributions to the plastic art by Revirdin, Wolfe, Krause, Thiersch, Beck, Brophy, Davis, Brown, New, Blair, Ivy, Gillies, Logan, Moorehead, Kazanjian and other eminent surgeons.

It is believed that organized medicine and dentistry must educate the public to the real value and work of the ethical and self-respecting modern plastic surgeon, and thereby offset the atmosphere of disrepute which has developed through the unscrupulous advertising of the beauty quacks and charlatans. In fact, every division of legitimate medical curative art has been more or less invaded by these parasites through their news "write-ups" and craftily worded advertisements.

The enormous amount of material available as a result of the World War was responsible for the establishment, on

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 10, 1933.

a sound basis, of many procedures on plastic surgery which previously were merely experimental. Among the methods of modern advancement, I would place special emphasis on the great value of (1) the use of Gillies' tubed pedicle; (2) the use of a modeling compound method in the application of the Thiersch graft, and (3) employment of the cartilage transplant. Plastic surgery of the face and that involving the oral tissues are, in my opinion, the most difficult branches of general surgery from the standpoint of cosmetic appearance, restoration of normal function and, frequently, the presence of infection.

Fig. 1 (Case 1).—Excessive scarring of left ear and cheek resulting from third degree burns caused by ignited gasoline; followed by keloid formation. The cartilage was involved.

Fig. 2 (Case 1).—Result obtained from reconstructive surgical measures followed by roentgen-ray and radium therapy treatments.

The restoration of normal function to unfortunate children afflicted with congenital cleft palate and cleft lip is, indeed, a credit to plastic surgery.

It is to the late Truman W. Brophy, whose research and contributions to this technic have proved so valuable, that I wish to pay my tribute and express my sincere appreciation for advice and guidance during my medical training.

The automobile is possibly the greatest factor in producing deformities of the face, nose and jaws. Indulgence in present-day sports, such as boxing, wrestling, football, basketball and swimming, often results in cauliflower ears, broken noses and jaws, torn and lacerated facial tissues. All demand efficient repair. Plastic surgery is needed for the removal of scar tissue, especially following burns where the destructive action has produced an unsightly appearance or impaired function. Reconstruction is needed to correct an unsightly ectropion or a facial deformity resulting from paralysis of a facial nerve. An ear may be rebuilt or restored and protruding jaws reduced.

We believe that the nose is the basis of good looks. Cosmetic indications for the correction of an awry deformed nose must not be undervalued, and impaired breathing must be given great consideration. The surgical correction of a nasal defect has, then, for its object correction of defects causing inflammation, the improvement of the vital functions of respiration, deglutition and phonation, and improvement of the personal appearance. It is believed that trauma is the causative factor in at least 75 per cent of these cases. Injury may antedate the patient's memory, for the developing bone and car-

tilage in early childhood are very tender and even a slight blow may produce displacement of the nasal bones or deviation of the nasal septum. Such abnormalities cause mouth breathing, which may result in irregularity, failure to erupt or impaction of the teeth, the formation of abnormal dental arches and protrusion of the jaws. Displaced, undeveloped nasal bones or an injured septum may continue to ossify at a vicious angle. Trauma to the nose in early childhood appears to cause less fibrous adhesions and exostoses than trauma in later life.

Modern reconstructive rhinoplasty makes possible complete nasal restoration. In this restoration, the nose is constructed from skin flaps and cartilage transplants. The nasal lining is restored by split skin-grafts and the nose is shaped and molded to proper anatomic form.

Fig. 3 (Case 1).—Excessive scarring of right cheek and partial loss of right ear.

Too much cannot be said in condemnation of an artificial prosthesis for restoring the nose, an ear or the palate. It cannot be compared with restoration by surgical methods, utilizing the patient's own tissues. Here, the result is permanent and leads to greater happiness and no inconvenience to the patient.

The relationship between foci of infection and general systemic disease has placed a great responsibility on the dentist and the oral surgeon. Prosthetic dentistry has scientifically advanced within the past few years. Its efficiency is due to modern prosthetic technic and to proper surgical preparation of the mouth. Scientifically constructed dentures may be useless if the oral tissues have not been well prepared. The mere "pulling" of the teeth is being rapidly replaced by surgical procedures. Normal or abnormal, infected or noninfected teeth or impacted teeth demand careful aseptic surgical technic for their removal and postoperative care.

Fig. 4 (Case 1).—Reconstruction of right ear and absence of keloid scars.

Partial destruction of the upper and lower arches by accident or disease; the obliteration of the buccal and labial sulci by connective tissue adhesions, or the atrophy of the alveolar ridges with subsequent obliteration of the buccal and labial sulci makes it impossible for the prosthodontist to construct efficient dentures. The auto-epidermic inlay graft, following the dividing of intra-oral adhesions and the rebuilding of sunken alveolar ridges, marks another step forward in modern oral surgery. The lining of the intra-oral sulcus was first introduced by Esser during the World War.

His technic has been widely modified in several cases, with gratifying results, his grafts being applied extra-orally. Ours are applied intra-orally. I presented this technic, with illustrations, in a paper read before the American Society of Oral Surgeons and Exodontists in 1924.

Every case of reconstructive surgery demands skill and care. In every possible case, I take photographs and also make preoperative models. The face mask or oral impression, if carefully made, will produce an accurate reproduction of the part to be operated on. Such lesions as a scar, cleft of the lip or palate or deformity of an ear, the nose or a jaw, can be accurately duplicated in model form. Accurate models are valuable in planning the operation and in the construction of case splints and the outlining of flaps, for the molding and reshaping of the tissues, in order to restore anatomic form and outline.

Fig. 5 (Case 2).—Identical twins. The nose of the twin shown below is shortened, depressed and notched. The facial expression is drawn.

Not only are accurately made models and sharply detailed photographs valuable preoperative adjuncts, but they are also invaluable as permanent records. In addition, a comparison can be made between the preoperative condition and the results of reconstruction. It is needless to say that photographs should never be retouched, because the detail of the final result is hidden. Consequently, the results of the operation are camouflaged, and therefore unscientific.

Fig. 6 (Case 2).—Identical twins. The profile and facial expression of the patient have been improved. Nose reconstruction was carried out by transplantation of cartilage from the eighth rib, followed by careful molding.

I have endeavored to show how the unfortunate person who has been disfigured by disease can be aided by reconstructive plastic and oral operations. In accidental disfigurement, the Great War taught the public that success could crown the seemingly impossible. Today, with traffic accidents, the use of high powered machinery and freely operating gangsters, we have almost an even greater need for restoration measures among civilians. The public is coming to realize what can be accomplished by the well-trained reconstructive plastic surgeon in comparison with the charlatan, who promises everything, accomplishes little, charges exorbitant fees and often does irreparable damage.

Fig. 7 (Case 2).—Profiles of identical twins. The nose of the uninjured twin was used as a model in reconstructing the nose of the injured twin.

I shall present a few of the interesting and unusual cases that have come under my observation—interesting as well as instructive from the standpoint of reconstructive surgery. They illustrate how human beings may be afflicted, coming to possess an inferiority complex and suffer functionally and socially from pathologic derangements caused by conditions of heredity, disease, infection or accident.

REPORT OF CASES

Case 1.—A boy, aged 8 years, when 4 years old, had received a third degree burn when his father's cigaret ignited a bucket of gasoline. The healing of the burned areas about the ears, cheeks, lips and neck was rapidly followed by keloid formation, which enlarged to such an extent that the child's appearance was most unsightly. The keloid formation was difficult to combat. Prior to and following surgical procedure roentgenotherapy proved inadequate and radiotherapy was substituted. The unsightly scars have been removed. The boy's personal appearance has been improved. Reconstructive plastic operations have restored a human being to a normal happy life, and he will no longer be an object of ridicule to his schoolmates. (Figs. 1-4.)

Fig. 8 (Case 3).—Result of hatchet blow in childhood: unevenness of vermilion border of upper right lip and spacing between lips.

Case 2.—A girl, aged 16 years, one of twins, who, the mother states, were so nearly identical that she had found difficulty in differentiating between them before infection caused the disfigurement of the patient, at the age of 12 had a nasal operation, followed by infection which destroyed a portion of the nasal septum. Loss of cartilage produced a deep notch in the nasal bridge, thereby causing a shortening and widening of the nose, and elevation and

narrowing of the upper lip. The patient was quite unlike her twin sister. The beauty of her profile was destroyed. The twins dress identically and are inseparable. Her facial deformity caused the patient to develop an inferiority complex. The sisters are motion picture stars and naturally such a deformity became a tragedy to the patient. Although for screen work her sunken nasal bridge was covered with wax and makeup by artists, the result was still a noticeable deformity.

A reconstructive rhinoplasty was a very delicate procedure, for she asked to be made to look just like her twin, as she did before the loss of the nasal septum by infection. The twin sister's nose was used as a model and guide. Face masks, photographs and models of both girls were made for study and accurate measurements were taken. Two cast metal appliances were constructed. First, an accurate metal splint was cast in silver from an impression taken from the carefully sculptured nose. This was of the desired anatomic shape and was made for the purpose of molding the tissues during the postoperative regeneration of the tissues. Secondly, a cast metal model was used for exact duplication in cartilage to fill in the defect. Two sections of cartilage were removed from the region of the eighth and ninth ribs. One piece was carefully carved to duplicate the metal model, and the other piece was implanted in the adipose tissue under the skin of the abdomen for future use if necessary. The result of this reconstructive rhinoplasty and the remodeling of the upper lip was highly satisfactory. In this instance, it has meant not only the eradication of a rapidly developing inferiority complex, but also continuation of success on the screen. (Figs. 5-7.)

Fig. 9 (Case 3).—Realinement of vermilion border of upper lip and closure of space between lips.

Case 3.—A woman, aged 62, had had her upper lip injured by a blow from a hatchet when she was 7 years old. This resulted in her not being able to close the upper lip sufficiently to cover the teeth. There was a deep notch in the lip and loss of the vermilion border. All her life, the abnormality had caused the patient anxiety and grief. After operation, she said that her one regret was that she had not known years before

Fig. 10 (Case 4).—Unsightly profile appearance due to congenital cleft palate, cleft lip and ill-advised surgical measures. The nose is short, flat and broad, the columella short. The nostrils are broad and there is retraction of the upper lip and protrusion and hypertrophy of the lower lip.

what plastic surgery could have done for her. (Figs. 8-9.)

CASE 4.—A man, aged 22, had a congenital unilateral cleft palate and cleft lip. There is a history of nine operations between the ages of 2 weeks and 14 years. The result of these surgical procedures is indeed appalling, as examination shows an unsightly profile; a very narrow and contracted upper lip; a hypertrophied and everted lower lip three times its normal size; a large cleft in the hard palate; a wide open soft palate; and a very short, flat, broad nose. The profile of this young man was atrocious, the case exemplifying the surgical results of work performed by an operator not trained in reconstructive surgery. The operator failed to close the clefts in both hard and soft palates. Also, he failed to reconstruct and remodel the nose. Last, but not least, he excised the premaxillary bones.

Fig. 11 (Case 4).—Cleft palate and wide nostrils and nose. The premaxillary bones had been excised in infancy.

This young man, now 22 years old, has suffered all of his life both functionally and socially from his bad appearance and his speech impediment. A deformed face alone is enough for one to bear, but this, coupled with the added affliction of impaired speech, gives the unfortunate one a feeling of being unwelcome in school or the business and social worlds. The rebuilding of this young man's face and mouth has required many operations. The reconstructive procedures consisted of: (1) lengthening of the upper lip; (2) reduction of the lower lip; (3) narrowing of the nose and reshaping of the nares; (4) closure of the cleft in the hard palate; (5) closure of the cleft in the soft palate by a "push back" operation; (6) construction of a special dental appliance; (7) lengthening of the nose and elevation of the nasal tip by transplantation of cartilage; (8) lengthening of the columella by utilizing the tubed graft secured from the chest; (9) widening of the upper lip by utilizing the tubed graft

Fig. 12 (Case 4).—Closure of cleft in hard and soft palates by Dorrance "push-back" operations.

secured from the chest, and (10) reconstruction of the philtrum and cupid's bow.

It is my opinion that the long series of plastic measures would have been unnecessary could the patient have been operated on when an infant by one skilled in reconstructive surgery. He would have been saved, thus far, an unhappy life of impaired function and mental anguish. (Figs. 10-14.)

CASE 5.—A girl, aged 18 years, gave a history of having had neuralgic pains in the face and jaws for the past ten years. She

Fig. 13 (Case 4).—Reconstructed face, with model depicting patient before operation.

was subject to an average of three convulsions a week. She appeared to be nervous, anemic and undernourished. Except for oral sepsis, the physical examination was negative. Roentgen-ray examination of the sinuses and teeth revealed several abscessed teeth; also, impacted teeth. All sinuses were clear with the exception of the left antrum, which showed a foreign body, which was identified as a malformed, unerupted tooth. The patient was operated on by opening the antrum through the facial wall and the foreign body was removed. It proved to be a rubber cork. (Figs. 15-16.) The supposition is that this patient, when a child, pushed the cork into her nose. It, no doubt, remained in the nasal cavity and caused infection of the tissues, resulting in a dissolution of the naso-antral wall, permitting it to pass into the antrum. There was a small opening existing in the naso-antral wall beneath the inferior turbinate. The rubber cork was inclosed in a calca-

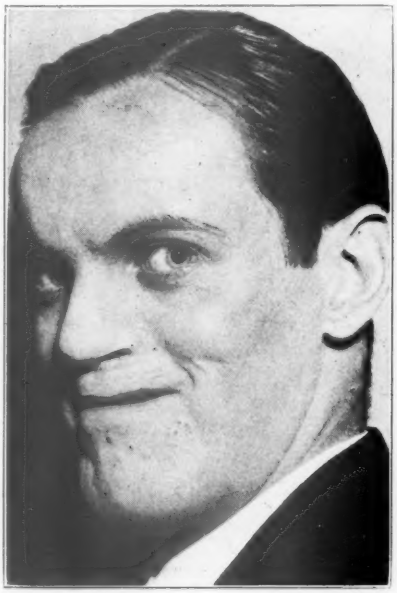


Fig. 14 (Case 4).—Result of numerous reconstructive operations.

reous capsul and infected material. The antrum was closed and a few treatments were given through the nasal cavity. Regeneration took place within a few days. Three abscessed teeth and two impacted teeth were surgically removed. This patient was dismissed, after the operation and treatments, three months ago. A recent examination revealed that her general physical condition is greatly improved and

the neuralgic pains have disappeared. During the three months, her mother states, she has experienced only six or seven convulsive attacks, and they were of short duration and only minor in severity as compared with the attacks she had experienced in previous years.

I do not wish to state that her convulsive attacks may entirely abate, but there has been an almost unbelievable improvement in her condition. (Figs. 15-16.)

CASE 6.—A woman, aged 25, had suffered a nose injury at birth owing to misuse of

Fig. 15 (Case 5).—External operative area ten days after removal of rubber cork from antrum. The cork is shown in the lower part of the photograph.

forceps. She is in public life, being a school teacher, and has developed an extreme inferiority complex. She stated that, from early childhood, she had been extremely conscious of her deformity and had suffered mentally owing to her appearance. Not only had the acquired nasal disfigurement impaired her personal appearance, but the constricted nares prevented normal breathing. Figure 17, *A* and *B*, shows the nose to be elongated, with a broad, flat, depressed tip, an excessive "hump" and abnormally shaped nostrils.

Operation consisted of reducing the protruding nasal bones, shortening and lowering the septum, narrowing and pointing the tip, elevating the columella, shaping the nostrils and reducing the nasal processes of the superior maxillary bones. Figure 17*C* was taken three months after operation. Attention is called not only to the improvement in the nasal form but also to the facial contour, widened upper lip and pleasing facial expression. This young woman has developed an entirely different mental attitude. She is not depressed and

Fig. 16 (Case 5).—Cork shown in two films of different size.

her inferiority complex has vanished owing to restoration of normal breathing and the improvement in her personal appearance. (Fig. 17.)

CASE 7.—A man, aged 30, who had been a boxer for a number of years, had suffered a broken nose on two different occasions. He stated that, owing to difficulty in breathing, he had been obliged to discontinue his boxing career. Figure 18*A* shows his profile before a corrective rhinoplastic operation was performed. Examination of his nose revealed that it was elongated with a depressed lower end and protruding

alae, owing to displacement of the quadrilateral cartilages and fracture of the nasal septum. The nasal bones protruded prominently, causing an excessive "hump," which was, no doubt, the result of fracture. The inferior turbinates were hypertrophied and the nasal passages practically occluded.

Operation consisted of reduction of the inferior turbinates, straightening and elevating the nasal septum, raising the nasal tip and columella, reducing the convexity of the alae, reshaping the nostrils, replacing the nasal bones and reduction of the nasal processes of the maxillary bones. Figure 18*B* shows the patient a few weeks after the intra-nasal and rhinoplastic procedures. Normal breathing was restored and the personal appearance of the patient greatly improved. (Fig. 18.)

Fig. 17 (Case 6).—*A* and *B*, acquired nasal deformity from misuse of forceps at birth. The nose is long and humped, with a low, flat, broad end. *C*, result of corrective rhinoplasty.

Case 8.—A woman gave a history of having a lower right third molar removed. After a lapse of six months, a fistula appeared in the lower right cheek. (Fig. 19 *A*.) She explained that the socket from which the third molar had been removed healed over within a few days and at no time had she experienced pain. She had consulted several doctors and dentists and numerous roentgen-ray films had been taken. At present, her only complaint was of a copiously discharging fistula on the cheek which required frequent change of dressings.

Intra-oral examination showed that the patient took excellent care of the teeth and practiced oral hygiene. No intra-oral lesions could be found.

One smear taken from the external opening of the fistula, on staining, revealed numerous pus cells, a few gram-positive and gram-negative bacilli, a few fusiform bacilli and a moderate number of spirilla. A second smear, obtained from the inside of the fistulous tract, on gram staining, showed a moderate number of pus cells, among which were a few gram-positive cocci in chains and an abundant number of fusiform bacilli and spirilla. More pus cells appeared on the smear taken from the outside, while the smear taken from the fistulous tract presented a typical picture of Vincent's infection. Moreover, the findings from the

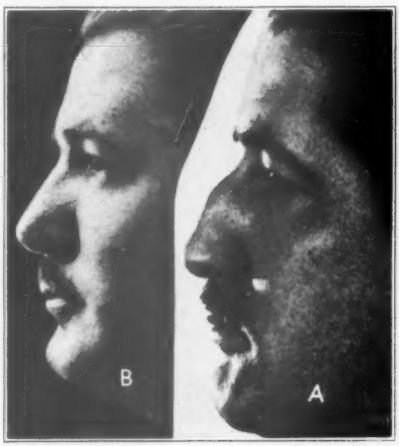


Fig. 18 (Case 7).—Right, acquired nasal deformity. The nose was broken twice during fistic encounters in the ring. Left, appearance after operation.

outside smear were indicative of Vincent's.

I injected lipiodol into the fistulous tract, which was found to extend to the third molar socket. (Fig. 20.)

Treatment consisted of opening the third molar area by incising the apparently healthy mucoperiosteum covering the area. The fistulous tract was treated by irrigation. Two intravenous neoarsphenamine injections were given. Within three days, no discharge was apparent and, within ten days, the tissues were apparently healed.

This long-continued infection had caused an adherence of the skin to the mandible at the fistulous opening which destroyed the normal surface contour, an unsightly scar resulting. Figure 19*B* shows the appearance of the tissues after reconstruction. The adherent scar was separated from the mandible; the surrounding subcutaneous tissues were approximated, and the normal surface contour was restored. (Figs. 19-20.)

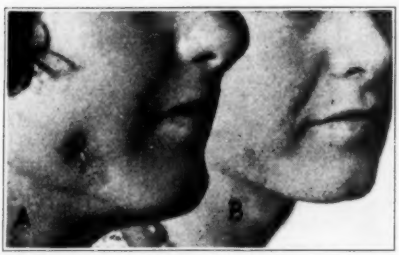


Fig. 19 (Case 8).—*A*, external opening of discharging fistula caused by infection of lower third molar socket and Vincent's infection. *B*, results of plastic operation one month later.

Scientific application of modern technic makes rebuilding possible in the case of the person who has been maimed through accident or disease. Reconstructive plastic and oral operations undoubtedly form one of the most difficult branches of general surgical work and should never be attempted by one not thoroughly trained. Almost every deformity of the face and oral cavity produced by the loss or excision of the soft tissues, or by the loss of bone by destruction or removal, can be satisfactorily corrected. The congenital or acquired deformities about the face, nose, lips, jaws and oral cavity may be greatly improved or entirely corrected; which not only restores function, but personal appearance as well.

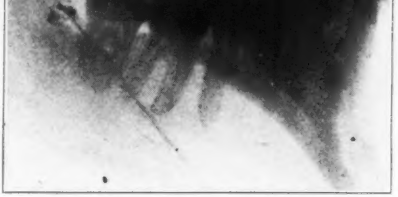


Fig. 20 (Case 8).—Fistulous tract as depicted by lipiodol.

A facial or oral handicap impairs function and mars one's appearance, and, in this highly specialized age, in order to attain success in any line of endeavor, it is imperative that one use every reasonable means of making a good impression.

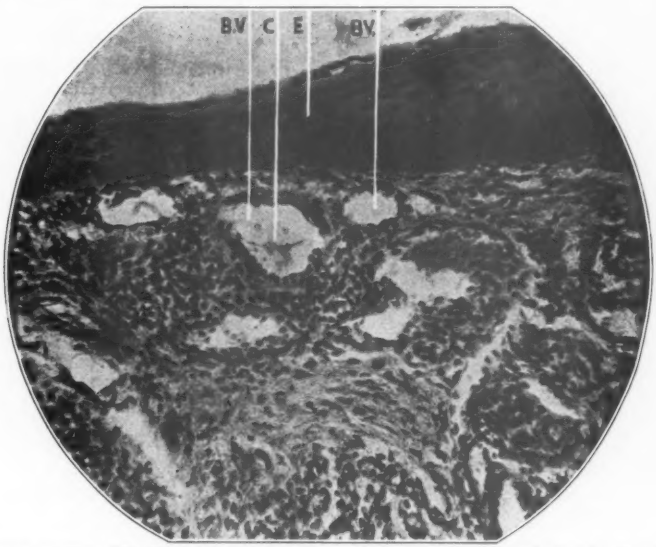
Wilshire Medical Building.

PREGNANCY EPULIS: REPORT OF CASE

By E. K. TRATMAN, B.D.S., L.D.S., Singapore, S. S.

A WOMAN, aged 20, of Dutch-Indian extraction, attended the clinic on account of a growth which she had first noticed three weeks previously and which had been slowly increasing in size. She was seven months pregnant (second pregnancy). There had been no growth on the occasion of the first pregnancy.

The growth, which was painless except when manipulated, was reddish purple with a covering of mucous membrane. A slight degree of secondary inflammation was present and a slight tendency to hyperplasia of the nearby gum tissue. The growth was pedunculated, but not excessively so, soft, bled easily and appeared to be growing from the edge of the alveolus at the level of the middle of the labial surface of the upper left central incisor. It measured 12 mm. from above downward and 5 mm. from side to side.



Pregnancy epulis. *BV*, blood vessels; *C*, red blood cells in lumen of vessel; *E*, epithelium. There is some round-cell infiltration. (×90.)

The teeth as far back as the first bicuspids were in perfect condition, being free from caries and salivary calculus of either type. The mouth generally was well cared for and in an excellent state.

The growth was removed under local anesthesia, when it was found not to be growing from the bone but from the periosteum. The report of the pathologic de-

partment of the hospital was as follows: "The histologic appearance is that of the solid type of hemangioma simplex." The epithelial covering was thin and even absent in small areas. After six months, there has been no recurrence.

The tumor, in its history and nature, closely resembles those described by Blum.[1] In this case, the tumor was not growing from the interdental pyramid of gum, but from the gum above the middle of the labial surface of an upper central incisor tooth.

1. Blum, Theodor: Pregnancy Epulis, J.A.D.A. 18:393 (March) 1931.

VARIATION IN TECHNIC FOR REMOVAL OF IMPACTED LOWER BICUSPID

By HARRY J. FIELD, D.D.S., and ALFRED A. ACKERMAN, A.B., B.Sc., D.D.S., Newark, N. J.

THIS case has interest as offering a variation from the usual surgical procedure employed in the extraction of an impacted lower bicuspid.

The bite view (Fig. 1) clearly shows

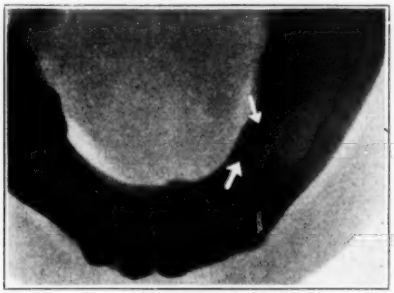


Fig. 1.—Crown of impacted lower bicuspid pointing toward lingual plate of bone with apex running under first bicuspid.

the impacted member lying across the mandible with the cusps of the crown entering the cortical plate of bone on the lingual aspect and the root directed downward, forward and toward the buccal plate. The ordinary dental film (Fig. 2) reveals both the depth of the impaction and its relation to the first bicuspid.

With the tooth definitely localized, the problem of the correct surgical approach becomes immediately manifest. If we are to operate in the orthodox manner from the buccal side, it will be necessary to remove a large section of dense bony structure. The danger of injury to

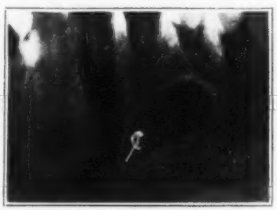


Fig. 2.—Ordinary dental film revealing depth of impacted member and its relation to adjacent structures.

the first bicuspid and the greater danger of causing a permament numbness in the chin and lip by the inadvertent destruction of the nerve emerging from the mental foramen are obvious.

Before operating, we had planned to reflect a buccal flap and remove sufficient of the buccal bone to expose the crown of the embedded tooth. We had then planned to divide the crown from the root with surgical drills. This would

permit us to remove the crown and displace the root into the area occupied by the crown, a standardized technic.

We found, when we actually opened into the bone, that while we were able to expose the crown fairly well, division was not feasible owing to the intimate relationship of the tooth to the first bicuspid. We observed that we could get slight movement of the tooth with elevators, but that any real movement was prevented by the impingement on the lingual plate. To remove the entire lingual plate of bone down to the tooth crown would have produced an ugly deformity as an end result.

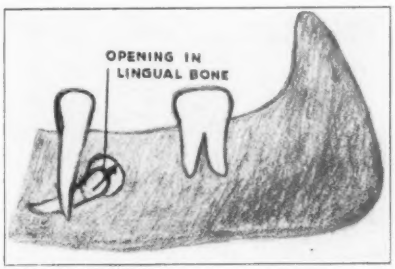


Fig. 3.—Schematic representation of technic employed. The opening in the lingual plate of bone has been cut with the Parker ossisector.

We decided, therefore, to reflect the mucous membrane and periosteum covering the lingual bone and to create an opening in this bone sufficiently large to permit of the passage of the tooth. The alveolar ridge of the bone was to be left intact. Working from within the bone cavity with the Parker ossisectors, we were able to produce such an opening without disturbing the ridge of the bone.

As we had foreseen, we were now able to elevate the tooth upward and toward the lingual aspect, gradually forcing the body through the hole in the lingual plate. We have endeavored to depict in Figure 3 the operative area at the time of removal. Following the removal of the tooth, all sharp bone margins were trimmed and the loose débris removed. The flaps were then replaced and sutured into position. The immediate postoperative roentgenogram is shown in Figure 4.

Postoperatively, the case did quite

Fig. 4.—Immediate postoperative bite view, showing lingual plate of bone intact.

well, healing being uneventful and fairly rapid. There was no unusual involvement of the lingual soft tissues, and the crest of bone which had been left acted as a splint across which new bone could be thrown. The end-result was rather gratifying, there being no deformity at the lingual aspect and only a small loss of the bone at the buccal.

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Editorials

THE CHRISTMAS SEALS

Christmas! There is magic in the word. It never grows commonplace, or ordinary, or stereotyped or out-worn, nor does its sentiment ever grow stale. Christmas is the one outstanding perennial appeal in the world. For nearly 2,000 years, it has been the steady beacon light that has never become dimmed, and that has grown brighter and more luminous as the centuries pass.

Christmas grips the hearts of all the people; the young, the old, the rich, the poor; and never a one so plebeian or so patrician as not to be won by its tender touch. In the hovels of the humble, the wreaths are hung, and in the hall-ways and hearths of the rich, the same wreaths and the same cheer are made manifest.

Christmas is the great leveler, the great uplifter, the great sanctifier. The staid and sober sage peering over his spectacles as he clasps his ponderous tome must pause for a brief spell and give way to the temper of the hour when the chimes of Christmas bring

music to the soul of every man, the learned savant and the humblest peasant.

But most of all, Christmas is the children's Mecca. Around the sacred shrine of Christmas, there gather the happy hearts of childhood bringing their laurel wreaths and their tiny tributes to their patron, the dear immortal Santa. Small, eager and tremulous fingers touch with awe the glittering trinkets of the day, their eyes wide with wonder, and their hearts beating high in unison with the marvel of the Yuletide tree.

Christmas is the typal harbor of the home and the fireside, where loved ones gather around the hearth and forget the sordid side of life. No longer do we think of marts of trade or the strident clamor of the counting house. Whatever else may come and go, the constancy of Christmas keeps us to the eternal verities of life, and binds us in a common brotherhood of man, where hope and cheer, and charity and loving kindness hold sway above the meaner, baser temper of the times.

In our own Association, we have ample incentive for the cultivation of the higher and more generous impulses of our common humanity. Through the medium of the Relief Fund, we have for years given succor to many of our needy fellow members. With a large number of them, it has meant the difference between dire want and tolerable comfort, and it has smoothed the downward path of life and made their declining days happier and more bearable.

If the full measure of adequate aid to the aged and unfortunate is to be met, we must build our Relief Fund to larger proportions to cope with the increasing demand. The difficult days just past have thrown on many a worthy member the blight of threatened penury, and we cannot afford in an organization like ours to let any member suffer the humiliation and misery of want. The splendid service that has been rendered by the Relief Committees and Commissions is ample justification for the loyal support of this worthy activity, and when the Christmas seals are sent out this year, we trust that the response will be as nearly as possible 100 per cent.

The individual contribution of one dollar means so little in the

way of sacrifice, while the aggregate in the way of relief means so much that we are sure if all of our members would only stop to think of it, the response to the appeal of the seals would be unanimous. If the full story of all of the circumstances connected with the numerous cases of relief that have been administered since this service was started could only be told, it would prove a chapter filled with a record of worthy endeavor and splendid achievement. In this connection, it seems proper to record at this time the faithful service of one of the members of the Relief Commission, Dr. John H. Cadmus, who so recently passed away. His devotion to the best interests of this work was one of the active agencies in bringing it to a successful issue, and the Association as a whole, and those who were aided in particular, owe a debt of gratitude to his memory.

THE PUBLIC RELATIONS COMMITTEE

The functions of the various Public Relations Committees in all sections of the country are becoming more and more important as the scope of dental association effort is being widened by a more comprehensive grasp of the relationship between the public and the profession, and between the different groups in the profession itself.

One of the most extended studies of this character has been made by Harvey Stallard, of San Diego, Calif., and in the introduction he says: "A public relations committee in a dental society or association may care for all of those interests, contact relations, etc., that members of such organizations can enjoy collectively. The original purpose of a dental organization, locally, was to stop ruinous criticisms arising between competitive dentists. In the early days dentists, at the time they joined the local federations, pledged that they would cease competitive advertising, stealing patients, criticizing brother dentists and committing various other acts calculated to injure their fellow practitioners."

In a very extended consideration of the question, every possible phase has been taken up by Dr. Stallard, embodying fifty-six long

typewritten pages of single spaced type, which shows the various ramifications into which this subject may lead. In our own Association, the present Director of the Bureau of Public Relations, Dr. Lon W. Morrey, is establishing contacts with every interest having to do with the welfare of the profession and the public.

This service embodies the questions of dental health education of the laity, radio broadcasting, public speaking, supplying educational material in the way of reprints, lectures, radio talks, posters, slides, films and every conceivable material that will interest dentists, hygienists, teachers, nurses and public health workers of all kinds. If a dentist is called on to give a talk in his community on any subject connected with mouth hygiene for the various lay groups, he may write in and secure from the Director in the Central Office suggestions and assistance in the development of these talks. Whether it be an audience of adults, a parent-teacher association, the members of a school board, a group of children in the public and parochial schools, high school children, a body of trained nurses, students of medicine or dentistry, an audience of industrial workers or any body of men or women who might be interested in, or benefited by, information on health problems connected with the teeth or mouth, here is a service of inestimable value. It is a service that is growing daily, and if in some way the profession outside of dental societies could be made aware of what is here presented for them in this service, there is no question that many of them would be brought into the ranks of organized dentistry.

In the contacts between our members and nonmembers, such services as these should be stressed at every opportunity. Without any question, if the full value of the service rendered by our Association could be brought home to our ethical nonmembers, every one of them would join. To carry this message to the profession generally seems to be the major problem in any campaign for increased membership, and in every approach to the many fine men who are still, for one reason or another, outside the ranks of our organizations, the twofold advantage of membership should be stressed. We need these men and they need us. More than all else, society at large needs the sustaining influence of the vast majority of the members of any profession.

Society is better served when there is unanimity of effort in the professions, and when the proper relationship exists between the professions and the public. We could all do a better job if we pulled together, and the public relations committees are all working to this end.

MEMBERSHIP

Membership increases are being reported in the journals and bulletins of component societies with cheering regularity. At this moment, the Central Office acknowledges 5,013 more members than a year ago, and nearly 8,000 more Journals are being mailed than at that time. This proves much and suggests more.

It proves that in spite of the demands made on members everywhere, time is being taken to advance associational interests. Loyalty is being attested. Organization has been developed, plans have been devised and arguments formulated and time has been budgeted for the campaign. It proves that committeemen are estimating the values inherent in the Association, the services it renders and the programs it visualizes for future undertakings. And this augurs well for the Association. The studies these men make not only intensify their enthusiasm, but also give the Association itself its homogeneity. This condition is priceless to such a body.

The consent of men to become members proves that they have thought these values out and esteem them. Their minds were open to the arguments presented. They realized the need of organized effort and of being a part of it. To all the endeavors of the major body, they would lend a hand, participate in person. In their local societies, they will find hearing for their ideas, an arena for their activities. They will find, too, stimulating companionship and will stimulate in turn. They will sense real importance in the support which they give and the influence which they extend in national affairs. They are now more than local dentists; they are agents of American dentistry.

A membership campaign is more than a competitive affair be-

tween states and localities. It is no humbling process on the part of the parent body simply to gather strength for the sake of strength. There is nothing diminishing to such a body in evangelizing those who are still outside. There is rather the evidence of faith in its own ideals and objectives, faith in its own essentiality as a high powered public service. Its approach to any man is testimony of its faith in his conception of service and assurance of his betterment, his possibilities, through its agency, to his community and beyond. The association must name its objectives, outline its plans, define its will, to put enthusiasm and purpose into the heart of its members and keep their vision large.

The campaign proves that men who are not alined are interested in the basic values of their profession; that many have stayed apart because of circumstances which were difficult or impossible of control; that when they found themselves able, an assurance of cordiality was all that was needed to obtain their consent.

It might be well to suggest that the societies that are hosts to an increasing personnel have an obligation. Older members of any organization may easily settle into a state of laissez faire and expect newcomers to be content with a static condition. Newcomers should mean new conditions, an enlivened atmosphere, a revived spirit, new endeavor, with the fervor of the new members to abet it. In addition to the usual programs that are hard to keep keyed to pitch, the broader view of associational purpose should be injected and instructive educational programs on associational plans and accomplishments be given.

There has been long talk of dental education for the laity; there might well be an educational program for the profession. The profession welcomes information that gives strength and effectiveness. A profession is not a navy to sail under sealed orders; it is not an army that marches to command. A profession wants to know where it is going and why it is going there, know what is done or to be done along the way and after it arrives.

T.

ACCEPTED DENTAL REMEDIES

The first edition of Accepted Dental Remedies went to press in the summer of this year and in August was displayed at the St. Paul Session. At this moment, just three months after the Session, the book has had three printings—a justification of the hope, surely, that it would be valued for its usefulness and ethical purpose. Its sale is a proof not of mere curiosity, but of a high ideal in dentistry.

In verification of the acceptability of Accepted Dental Remedies, a teacher writes: "This book is the best I have used in teaching dental pharmacology and therapeutics. At present, I am using it with a larger textbook. I congratulate you and the Council on the excellent work in compiling A.D.R." This was written to the Secretary of the Council and voices the sentiments of many others, both teachers and practitioners. The latter attest that it has saved them many times the price of the book, and, more important, has enabled them to discuss drugs with intelligence.

From these testimonies, one is assured that A.D.R. is meeting a long felt need. In the nature of things, this little volume is not the last word. The Council proposes that it have annual revision, which its users will appreciate. It is not intended to replace the larger and more detailed textbooks. It was not and is not intended as a textbook at all. Its purpose is to carry a selected list of official preparations and acceptable proprietary products for dental practice. Dentists from Maine to Oregon, from Minnesota to Louisiana, and from Mexico, Canada, India and Europe have purchased copies, and most of the dental schools in the country are either using it as a required aid or are recommending its use in conjunction with other texts.

The widespread acceptance of the book indicates an appreciation that drugs act as two-edged swords. In competent hands, they are instruments for good; endorsed only by the label, they are, in the hands of the laity or uninformed practitioners, instruments of harm. The unanalyzed, overadvertised pain reliever will not be dispensed on a salesman's or an advertiser's word.

The adoption of A.D.R. by the schools indicates that the prac-

titioners of tomorrow will be interested in the work of the Council. They will look for its judgments, ask for its approval; they will depend on its analyses, feel safe in its recommendations. The Council's activities will not be looked on as an interference, but as the Association's will to protect practitioner and patient.

And this is important. To dentist or physician, the patient's welfare must always come first. A doctor may not feel the need of telling his patient what he is using, but he must have that knowledge himself. If he does not have it, he submits himself to incalculable hazard. Likewise, he levels himself with the medicine man and witch doctor. The faith healer who trusts himself to something of which he knows nothing is his superior. A man recoils from the facts if they are put into raw words: "I don't know what I am using nor what it will do. 'They say' it helps or cures, so I use it." Self-respect, a man's most priceless possession, consciousness of being right, predicates itself upon knowledge. A man has no security, no self-esteem without it. This fact must be a man's first premise in any argument about the right or wrong of drug usage. And A.D.R. separates the right from the wrong. Every practitioner should provide himself with a copy.

T.

THE COLLECTION RACKETS

We doubt not that there are honest collection agencies who are anxious to do a creditable service to their patrons, and who conduct their affairs along strictly legitimate lines, but it so happens that of late our Central Office has received numerous complaints from our members to the effect that they have been imposed on by fake concerns who have collected bills and failed to make returns. The stringent times with tardy collections have induced some men to turn over accounts to an agency with the hope that the methods of the agency would result in better collections than the dentist himself could make. It is natural for a practitioner who has worked hard for his money to want to collect his accounts, and when his own efforts at collection seem to be futile, there is a temptation to

employ a collector to force payment. But there is one cardinal proviso that the practitioner should never neglect: He should never turn over accounts for collection without making certain that the agency is honest. If he cannot learn anything about the concern, he should never trust accounts to its keeping. There has been altogether too much racketeering in this respect, and we warn our members against trusting their accounts to unknown agencies.

Obituaries

JOHN H. CADMUS, D.D.S.

(1876-1934)

John H. Cadmus, widely known Chicago dentist, and for years a member of the Relief Commission of the American Dental Association, died October 30 at his home at 2509 Harrison St., Evanston.

Dr. Cadmus was a graduate of Northwestern University Dental School, class of 1908. He had practiced dentistry in Chicago for twenty-six years. He was a fellow of the American College of Dentists, secretary of the A.D.A. Relief Commission, member of Psi Omega Fraternity and active in the alumni association of his alma mater. In 1926-1927, he served as president of the Chicago Dental Society.

Surviving are the widow, one daughter, Mrs. Edwina Losey, of Des Moines, two brothers, two sisters and the father, Charles S. Cadmus, of Chicago. Funeral services were held in the library of the dental school of Northwestern University, with interment in Memorial Park, near Evanston.

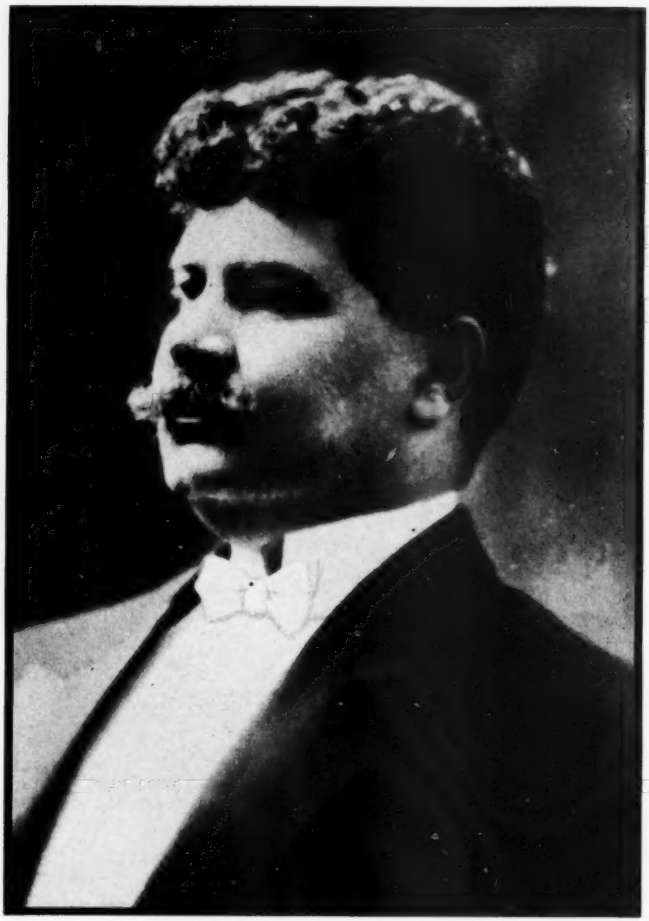
THOMAS CRENSHAW, SR., D.D.S.

(1858-1934)

Thomas Crenshaw, Sr., the oldest practicing dentist in the state of Georgia, and one of the oldest practicing dentists in the South, died at his home in Atlanta, October 3, at the age of 76. In his span of years, he had seen dentistry grow from a status little higher than that of a trade to the elevated position it now occupies in the field of health service. He contributed much to that growth through his work and influence.

Dr. Crenshaw was born in Athens, Ala. He received his dental training in Vanderbilt University, graduating in 1886. He was one of the original founders of the

JOHN H. CADMUS, D.D.S.
(1876-1934)



THOMAS CRENSHAW, SR., D.D.S.
(1858-1934)

Southern Dental College, which college combined in 1917 with the Atlanta Dental College, to form the present Atlanta-Southern Dental College. He was professor of dental materia medica in the Atlanta Dental College for a number of years, and later was named professor emeritus of that subject. At one time, he was secretary of the Atlanta Dental College. He was one of the most widely known dentists in the south, both professionally and socially. He began the practice of dentistry in Atlanta immediately after his graduation from Vanderbilt University, and maintained it in

the Grant Building, in Atlanta, until the day of his death, although he had been in declining health for several years. He was associated in practice with his son, Thomas Crenshaw, Jr.

Dr. Crenshaw was a member of the American Dental Association, the Georgia Dental Association and the Fifth District Dental Society. He was one of the first members of the Georgia Dental Association to be named an honorable fellow in that organization. He was also a member of the Georgia Lodge No. 96, F. and A. M. He belonged to that type of professional southern gentleman which is rapidly passing out of existence. Courtesy, dignity and friendliness were always characteristic of the man.

He is survived by his wife; his son, Thomas Crenshaw, Jr., of Atlanta; a sister, Miss Harriet Crenshaw, of College Park, Ga.; a brother, J. D. Crenshaw, of College Park, and two granddaughters, Misses Mary Seymour Ward and Jessamine Crenshaw Ward.

SHEPPARD W. FOSTER.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

Cavity Lining—A saturated solution of resin in chloroform makes an excellent cavity lining.—*L. E. Kurth, Chicago.*

Investment Material—Moistened powdered asbestos can be used as an investment material in making small repairs on crowns or bridges.—*L. E. Kurth, Chicago.*

Question of Extraction in Orthodontia—Extraction in the correction of malocclusion can be justified only when diagnosis and prognosis fail to disclose a reasonable line of treatment.—*Frank A. Delabarre, Boston, Mass.*

Use of Phenol to Allay Pain of Cavity Preparation—The use of phenol in a prepared inlay cavity just after it is cut allays considerable of the pain that occurs at the time of desiccation and sterilization before the inlay is set in place.—*F. J. Svoboda, Cozad, Nebr.*

Oiling Instruments, Etc.—If an instrument or appliance calls for oil, see that it does not lack for it. Ignorance or carelessness in this matter recently cost me the price of a new motor in my electric refrigerator. I keep my oil can handy now and oil things with some system. It pays.—*Ryland O. Sadler, Baltimore, Md.*

Personality—Every dentist has personality. It may be real or acquired, synthetic or genuine, active or latent. With many men, it lies buried so hopelessly deep that it can never dig itself out—alone. Whether it is inherited or acquired, the dental patient has no way of ever finding out. Booth was not a Hamlet, but he acted like one. Babe Ruth has personality plus—often called color or "it." His personality is even profitable. After all, isn't personality just being sensibly, reasonably, honestly, enthusiastically nice to our patients?—*Herbert Ely Williams, Red Bank, N. J.*

Oxychloride of Zinc in Pulpless Teeth—The great virtue of oxychloride of zinc in pulpless teeth is almost wholly ignored by the profession. There is no other material to compare with it as a barrier to bacteria. After the five canals at the apex are filled with eucapercha or other like semiliquid material, the canals and pulp chamber should be filled with oxychloride of zinc, and a permanent filling placed in the cavity. If this material had been used more generally, there would have been less trouble with pulpless teeth.—*Therapeutist.*

Cleaning Hypodermic Needles—To clean out a hypodermic needle after using, the rubber plunger is removed from an empty anesthetic cartridge with an instrument, one end of the needle placed in the rubber end of the cartridge, the air connection removed from the spray bottle and placed in the open end of the cartridge and air forced through the needle. If the cartridge opening is too large for a spray connection, soft modeling compound is placed in the open end and, with a round instrument, an opening is made in the compound of a size to accommodate the spray bottle connection. An air syringe may also be used.—*F. D. Voigt, D.D.S., Salem, Ore.*

Drug Applicator—For applying two drugs on the mucous membrane, this method is rapid and efficient. For example, when applying iodine followed by silver nitrate for ulcerations as advocated in the Adam's treatment, absorbent cotton is wound around both ends of a wooden stick, one end being dipped in the iodine and the other in the silver nitrate. The field is dried and the drugs are applied by just inverting the stick. The same method is applicable before piercing the mucous membrane with the needle. One end of the stick has a dry wad of cotton, the other end is dipped in iodine. The field is dried with one end, and the other end painted with iodine, and then injection is made with the needle.—*Henry Fischer, Kings Park, N. Y.*

Necessity of Dental Service for Children—The rapid growth of the idea of dental service for children, in the effort to fulfil the profession's responsibility toward general health, warrants the acceptance of the following axiom as the basis for such service. Dental service for children that eliminates all pathologic conditions and includes all items essential to a clean, healthy mouth cannot be wholly successful from the health standpoint, unless function is maintained or restored through orthodontic treatment. Function is the basic requirement of any organ. The delicate balance of interrelated bodily functions is essential to bodily health. Malocclusion is a serious handicap to mastication, the first step in digestion.—*Frank A. Delabarre, Boston, Mass.*

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

The Council has authorized publication of the following chapters on adherent powder for dentures and denture cleaners, which will be included in the next annual revision of Accepted Dental Remedies.

SAMUEL M. GORDON, *Secretary.*

ADHERENT POWDERS FOR DENTURES

Adherent powders which are used in connection with denture service are made from vegetable gums such as acacia, tragacanth and karaya. These materials, which are largely carbohydrate, swell to many times their original volume on the addition of water and assume mucilaginous properties. The powders are prepared by using certain of the gums individually or by mixing several of them. They may be flavored with oil of wintergreen, oil of peppermint or similar agents. Small amounts of borax, sodium perborate or other so-called antiseptics are added, but their usefulness has not been demonstrated.

A powder made from finely ground dry gum karaya or gum tragacanth will fulfil all legitimate requirements. The powder should be sifted evenly over the palate surface of the baseplate or denture while the latter are moist.

Some operators use adherent powders on baseplates during the construction of dentures to secure additional stabilization while taking the bite and making registration records.

It may be desirable to advise a patient occasionally to use an adherent powder inside a denture as a temporary measure, but its continual use over a period of time is discouraged because:

1. These products have no therapeutic value and are not beneficial to the tissues.
2. Their continuous employment frequently encourages the patient to prolong the wearing of a denture which should be adjusted or reconstructed.
3. The patient who expects to wear dentures successfully must break down a system of habits which tend to dislodge dentures and build up a system of habits that will support them. The use of powder creates a false retention and thus inhibits development of desirable habits of denture support.
4. The continual use of these powders is held objectionable by some of the consultants of the Council because the gluey substance formed becomes foul when combined with the oral secretions and may act as an irritant, particularly when local abrasion is present from an improperly fitting denture.

The Council will admit these products as nonmedicinal articles to A.D.R. provided they are designated as "So-and-So's Adhesive Powder" or "So-and-So's Denture Powder." This action was taken in order to do away with names which are exclusive, which imply special properties and which are not dignified.

Nyko Adherent Powder.—Nyko Adherent Powder is said to

be composed of powdered gum karaya, 80 per cent, and gum acacia, 20 per cent.

ACTIONS AND USES: See Chapter on Adherent Powders for Dentures.

Manufactured and distributed by Nyko, Incorporated, Chicago, Ill. No. U. S. patent. U. S. trademark 310,275.

DENTURE CLEANERS

One of the requirements for the satisfactory use of a denture is that it be kept as clean as possible. The secretions which collect on a denture are generally undigested food materials and organic and inorganic materials from the saliva.

Various products have been suggested for keeping dentures clean. Some of them are simple in composition and others are unnecessarily complex. The most essential instrument for cleaning the denture is the so-called denture brush, adapted, as far as possible, to the contours of the denture. The action of the brush may be assisted at times by the use of various abrasives or materials having a mild chemical action.

The following may be used in addition to the toothbrush: bicarbonate of soda, finely ground chalk or finely ground pumice. It has been suggested that the immersion of dentures in liquids analogous to sodium hypochlorite (solution of chlorinated soda, U.S.P.) (Labarraque's solution) followed by brushing, may be useful. One recipe is the following:

Common washing soda, 1 oz.

Chlorinated lime (bleaching powder) ½ oz. Powder and mix thoroughly, and keep in a glass bottle securely corked. For use: Add 1 ounce of powder to 1 pint of tap water and shake well. Decant after a few hours and keep in a glass bottle.

For dentures which have been worn, use half a teaspoonful to half a tumbler of water.

The nature of the material chosen to assist the brush should be dependent on the type of denture material. Formaldehyde and phenol-formaldehyde dentures are, on the whole, resistant to most chemical agents. Those denture materials of the ester type, that is, those in which cellulose acetate is used as a base, on the whole undergo decomposition when immersed in solutions having an alkaline reaction.

Experiments conducted in the A.D.A. Bureau of Chemistry have demonstrated that the strongly alkaline substances such as sodium hydroxide or sodium peroxide, which forms sodium hydroxide in contact with water, injure these substances relatively rapidly and their use is inadvisable.

Various so-called denture cleaners put up in paste form simulate in composition the more complex tooth pastes. The Council will consider each of these on their individual merits. The Council will agree to admit these to A.D.R. provided they are labeled in accordance with the Council's provisions for dentifrices and they are used solely for dentures outside the mouth.

Nyko Denture Cleanser.—Composition: The manufacturer presents the following composition: glycerite of starch, 35.84 per cent; Castile soap (Spanish), 1.19 per cent; syrup (Rock candy), 2.38 per cent; magnesium carbonate, 1.08 per cent; powdered gum tragacanth, 0.07 per cent; chalk, 41.82 per cent; water, 10.76 per cent; sodium bicarbonate, 5.98 per cent; flavor, 0.88 per cent.

ACTIONS AND USES: Nyko Denture Cleanser is marketed for use for cleaning dentures outside the mouth. See chapter on Denture Cleaners.

Manufactured and distributed by Nyko, Incorporated, Chicago, Ill. No U. S. patent. U. S. trademark 226,288 (April 5, 1927).

The following articles have been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association. The Council desires dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules which govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary.*

Anesthetics—Local

Procaine Hydrochloride, U.S.P. (See Accepted Dental Remedies, 1934, p. 40.)

Procaine (Novol).—A brand of procaine hydrochloride, U.S.P.

Manufactured by the Novocol Chemical Mfg. Co., Brooklyn, N. Y. No U. S. patent or trademark.

Procaine-Epinephrine Solution No. 1-Novol: Each cubic centimeter is said to contain: procaine (Novol) 0.02 gm.; epinephrine, 0.00005 gm.; disodium phosphate, 0.005 gm.; sodium bicarbonate, 0.005 gm.; sodium chloride, 0.0013 gm.; sodium bisulphite, 0.0019 gm., and distilled water to yield an isotonic solution. The epinephrine base is rendered soluble by acetic acid. The solution is stated to have a p_H of 6.7 when prepared. U. S. patents Nos. 1,843,554 and 1,924,685.

Procaine-Epinephrine Solution No. 1 in Cartridges (Anestubes) 2 c.c.
Procaine-Epinephrine Solution No. 1 in Cartridges (Anestubes) 2.5 c.c.
Procaine-Epinephrine Solution No. 1 in Ampules, 1.5 c.c.
Procaine-Epinephrine Solution No. 1 in Ampules, 2 c.c.
Procaine-Epinephrine Solution No. 1 in Ampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 1 in Ampules, 3 c.c.
Procaine-Epinephrine Solution No. 1 in Novampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 1 in Novampules, 5 c.c.

Procaine-Epinephrine Solution No. 2-Novol: Each cubic centimeter is said to contain: procaine (Novol) 0.02 gm.; epinephrine, 0.00002 gm.; disodium phosphate, 0.005 gm.; sodium bicarbonate, 0.005 gm.; sodium chloride, 0.0013 gm.; sodium bisulphite, 0.0019 gm., and distilled water to yield an isotonic solution. The epinephrine base is rendered soluble by acetic acid. The solution is stated to have a p_H of 6.7 when prepared. U. S. patents Nos. 1,843,554 and 1,924,685.

Procaine-Epinephrine Solution No. 2 in Cartridges (Anestubes) 2 c.c.
Procaine-Epinephrine Solution No. 2 in Cartridges (Anestubes) 2.5 c.c.
Procaine-Epinephrine Solution No. 2 in Ampules, 1.5 c.c.
Procaine-Epinephrine Solution No. 2 in Ampules, 2 c.c.
Procaine-Epinephrine Solution No. 2 in Ampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 2 in Ampules, 3 c.c.
Procaine-Epinephrine Solution No. 2 in Novampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 2 in Novampules, 5 c.c.

Procaine-Epinephrine Solution No. 3-Novol: Each cubic centimeter is said to contain: procaine (Novol) 0.02 gm.; epinephrine, 0.0000375 gm.; disodium phosphate, 0.005 gm.; sodium bicarbonate, 0.005 gm.; sodium chloride, 0.0013 gm.; sodium bisulphite, 0.0019 gm., and distilled water to yield an isotonic solution. The epinephrine base is rendered soluble by acetic acid. The solution is stated to have a p_H of 6.7 when prepared. U. S. patents Nos. 1,843,554 and 1,924,685.

Procaine-Epinephrine Solution No. 3 in Cartridges (Anestubes) 2 c.c.
Procaine-Epinephrine Solution No. 3 in Cartridges (Anestubes) 2.5 c.c.
Procaine-Epinephrine Solution No. 3 in Ampules, 1.5 c.c.
Procaine-Epinephrine Solution No. 3 in Ampules, 2 c.c.
Procaine-Epinephrine Solution No. 3 in Ampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 3 in Ampules, 3 c.c.
Procaine-Epinephrine Solution No. 3 in Novampules, 2.5 c.c.
Procaine-Epinephrine Solution No. 3 in Novampules, 5 c.c.

STOPAIN—NOT ADMISSIBLE TO ACCEPTED DENTAL REMEDIES

The Council has authorized publication of the following report.

SAMUEL M. GORDON, *Secretary.*

Stopain is the therapeutically suggestive name for a preparation advertised by King's Specialty Co., Fort Wayne, Ind., as:

A scientific technique for socket treatment. Prevents postoperative pain. Relieves pain caused by dry sockets.

Stopain technique is the best, safest, most practical and effective treatment for postoperative pain.

Exodontists are using the Stopain technique with almost 100% results.

The treatment consists essentially in applying to the bottom of each root socket a few drops of Stopain with a smooth end syringe needle. The formula is avowedly secret.

The following appears on the label:

Methyl-pyrocatechin glycerol anchusa Europhen.

Methyl-pyrocatechin is a little used name for guaiacol, and one not generally recognized by dentists. The A.D.A. Bureau of Chemistry concluded from an examination of the product that a mixture having the essential properties of Stopain could be made by mixing together equal volumes of guaiacol and glycerine. The rationality of including anchusa, a generally discarded plant drug, and europhen is not apparent. Hence, Stopain can be expected to do no more, no less, than a simple mixture of guaiacol and glycerine, equal volumes.

Guaiacol is known to possess the property of inducing a mild degree of anesthesia and has long been used in dentistry for that purpose. Admixture with glycerine merely dilutes the drug. Prior to 1920, LeRoy M. S. Miner suggested the use of guaiacol in glycerine to relieve postoperative pain (Smith, A. E.: Block Anesthesia and Related Subjects, St. Louis: C. V. Mosby Co., 1920, p. 840) and as such has a field of usefulness. In the interests of economy and in view of a knowledge of the composition, it is more advisable for dentists to purchase such a mixture under a properly informing name if one desires to use guaiacol diluted with glycerine; but to assert that it is the "best, safest, most practical and effective treatment for postoperative pain," as is done by the promoters of Stopain, is an exaggeration and unwarranted to say the least. Postoperative pain is not a single entity, amenable to one kind of treatment. It must be treated with careful attention to etiology, and sometimes the treatment is symptomatic.

In view of the foregoing, Stopain is declared inadmissible to Accepted Dental Remedies: because it is of semisecret composition (Rule 1); it is marketed with unwarranted and exaggerated therapeutic claims (Rule 6), and it is a mixture of well-known drugs sold under a therapeutically suggestive name (Rule 8).

At current market prices, one ounce of guaiacol and glycerine can be purchased at a small fraction of the cost of a one ounce bottle of Stopain.

The chemist's report follows:

Six original packages of Stopain (King's Specialty Co., Fort Wayne, Ind.), price $1.50 each, were purchased on the open market for examination.

The following appears on the label:

Methyl-Pyrocatechin Glycerol Anchusa Europhen. Formula of J. Geo. Kanouse, D.D.S. Apply in tooth socket after extraction on a piece of gauze and immediate relief will be obtained.

A flat point needle accompanied each of the packages.

Each bottle contained approximately 30 c.c. (1 fluid ounce) of a light brown, semi-

viscous liquid, possessing an odor of beechwood creosote or guaiacol. The specific gravity at 20 C. was found to be 1.158, and the refractive index at 20 C., 1.5060.

Qualitative examination indicated the presence of phenolic compounds, reacting to tests for guaiacol U.S.P., glycerine and small amount of organically combined iodine.

Quantitative examination yielded the following:

Chloroform extract (guaiacol)	55.5 gm. per 100 c.c.
Glycerine	58.3 gm. per 100 c.c.
Ash	0.007 gm. per 100 c.c.

No other determinations were made.

From the foregoing, it may be concluded that a product essentially similar to Stopain may be made by mixing together equal volumes of guaiacol, U.S.P., and glycerine, U.S.P.

(End of chemist's report)

TOPANOL—NOT ADMISSIBLE TO ACCEPTED DENTAL REMEDIES

The Council considered Topanol on its own initiative, in response to inquiries concerning it from members of the profession. After the report which follows was adopted, it was sent to the firm for comment. No reply was received from the firm. The report is therefore being published for the information of the dental profession.

SAMUEL M. GORDON, *Secretary.*

Inquiries have come to the Council concerning Topanol (formerly known as "Topicol"), put out by the Antidolor Mfg. Company, Inc., New York City. It is sold for inducing surface anesthesia with the following statements on the label:

Sterilizes and desensitizes the oral mucous membrane, making insertion of hypodermic needle painless. To be used instead of tincture of iodin.

The label states: "Contains Chloroform 20%, Isopropyl Alcohol 25%, Benzyl Alcohol 5%." According to a statement it is "the surface contact anesthetic par excellence; its action is rapid and intense." The directions advise its use for insertion of a hypodermic needle, scaling of teeth, lancing of abscesses, extraction of loose deciduous teeth, removal of alveolar splinters, application of rubber dam, cervical clamps, ligatures, etc. It is stated to be "One of the *Waite* Products."

According to the report of the chemist below, Topanol is seen to be an unduly complex mixture for obtaining temporary local anesthesia. It contains, in addition to two compounds which act on the sensory nerve endings (ethyl aminobenzoate and benzyl alcohol), chloroform, which in itself may be slightly anesthetic when applied locally, but the actions of which are those of an irritant. This accounts for its use as a rubifacient and vesicant in certain liniments. Appleton and Miller (*D. Cosmos,* 73:74 [Jan.] 1931) found that Topanol was markedly irritating to the oral mucous membrane. The medium for the drugs (namely, isopropyl alcohol and olive oil with ethyl acetate to which has been added small amounts of phenol, menthol and thymol) adds to the complexity.

The advisability of applying a topical local anesthetic prior to introduction of the needle may be dismissed with the remark that conservative surgeons prefer a careful technic with properly beveled, sharp needles rather than topical anesthetics, even though these may be nonirritating. If one desires to use a local anesthetic prior to the insertion of the needle, there are available less complex products over which the complex mixture present in Topanol has not been shown to have any advantage. These are cocaine hydrochloride in dilute solution, benzyl alcohol 1 to 4 per cent in aqueous solution or even in substance,

and others which would suggest themselves. No evidence has been made available by the firm that the use of this complex mixture is more advantageous than employment of these readily available products. The admonition that this be used in place of tincture of iodin is apparently based on any antiseptic action which this complex mixture may have.

According to the tests of Miller and Appleton, mentioned above, the product is antiseptic, but its irritancy argues against its use for this purpose.

The statement that "Topanol is the surface contact anesthetic par excellence" is unwarranted.

In view of the foregoing, the Council declares Topanol inadmissible to Accepted Dental Remedies: because a complete statement of composition does not appear in the label (Rule 1); tests to determine the composition as the product goes to the consumer are not available (Rule 2); it is advertised with unwarranted therapeutic claims (Rule 6); the Council cannot recognize the firm's right to a proprietary therapeutically suggestive name for a mixture of readily available materials (Rule 8), the mixture is unnecessarily complex and irrational and its use is considered not in the interest of the dental profession and the public (Rule 10).

The Chemist's report follows:

Six original packages of Topanol were received for examination. Each package consisted of a small bottle of liquid enclosed in a carton together with a circular.

The following appeared on the label:

Topanol (formerly known as Topicol). For surface anesthesia. Sterilizes and desensitizes the oral mucous membrane, making insertion of hypodermic needle painless. To be used instead of tincture of iodin.

Only for external use in oral cavity. Contains chloroform 20%, Isopropyl alcohol 25%, Benzyl alcohol 5%. Waite. The Antidolor Mfg. Co., Inc., New York, N. Y. Reg. U. S. Pat. Off.

The following is taken from a communication of the manufacturer concerning the composition:

The Active constituent of Topanol is Benzocain and its benzoate (10%) to which is added phenol (1%), camphor, menthol and thymol, in a solvent containing oil, ethyl acetate, chloroform, isopropyl alcohol and benzyl alcohol.

Each bottle contained approximately 29.5 c.c. (1 fluid ounce) of a clear brown liquid possessing a strong odor resembling that of ethyl acetate.

The contents of one bottle were examined first. The liquid possessed a specific gravity of 1.027 at 20 C., a refractive index of 1.4480 at 20 C., a surface tension of 29.0 dynes per centimeter at 27 C., and an acid reaction to litmus. A small amount ignited at room temperature burned with a luminous smoky flame, leaving a brown oil which burned on stronger heating, leaving no residue. Elementary qualitative analysis indicated the presence of chlorine and nitrogen. Sulphur was not found. The liquid was partially miscible with water (approximately 30 per cent), largely miscible with alcohol (approximately 85 per cent) and totally miscible with ether. With a 2 c.c. sample, one drop of water was required to produce a turbidity in the liquid on shaking at 27 C.

Distillation of 10 c.c. yielded the following: A fraction boiling 68-93 C. (approximately 45 per cent); a sharp rise in temperature from this point to 203 C.; a small fraction boiling 203-207.5 C. (approximately 2 per cent); a sharp rise to 280 C.; a viscous fraction distilling 280-300 C. (approximately 15 per cent). The amount distilling under 300 C. was approximately 65 per cent and was a colorless liquid. A dark brown residue remained in the flask.

Steam distillation of 5 c.c. yielded approximately 1 c.c. of a liquid heavier than water, which qualitative tests indicated was chiefly chloroform. Qualitative examination of the aqueous phase indicated the presence of ethyl acetate, isopropyl alcohol, benzyl alcohol and phenolic compounds. The odor of various fractions indicated the presence of thymol,

menthol and camphor. A yellow oil remained from which needle-like crystals separated on cooling. Qualitative tests indicated the presence of ethyl para-amino benzoate (benzocaine), benzoic acid and a fatty oil.

The five bottles remaining were bulked for further examination. The specific gravity of the resulting liquid was 1.023 at 20 C. and the refractive index 1.4480 at 20 C. Qualitative tests yielded the same results as described for the first sample.

Quantitative examination yielded the following:

Total nitrogen (N)	0.64	gm. per 100 c.c.
Benzocaine ($NH_2C_6H_4COOC_2H_5$)	7.3	gm. per 100 c.c.
Benzoic acid (C_6H_5COOH)	2.7	gm. per 100 c.c.
Chloroform ($CHCl_3$)	19.0	gm. per 100 c.c.
Fatty oil	21.9	gm. per 100 c.c.
Refractive index	1.473	at 20 C.
Iodine value	86.4	
Saponification value	183.4	

From the foregoing, the following may be calculated:

Benzocaine (from total nitrogen)	7.5	gm. per 100 c.c.
Benzocaine (direct determination)	7.3	gm. per 100 c.c.
Benzoic acid	2.7	gm. per 100 c.c.
Chloroform U.S.P.	19.2	gm. per 100 c.c.
Olive oil	21.9	gm. per 100 c.c.

Based on the foregoing, a product was prepared by mixing together in the order named:

Chloroform, U.S.P.	14	c.c.
Isopropyl alcohol	31	c.c.
Benzyl alcohol	5	c.c.
Ethyl aminobenzoate, U.S.P.	7.5	gm.
Benzoic acid, U.S.P.	2.7	gm.

To the clear solution, there was added:

Olive oil, U.S.P.	25	c.c.
Phenol, thymol and menthol, each	1	gm.
Camphor	2	gm.
Ethyl acetate	10	c.c.

The odor of the final solution was essentially the same as Topanol. The refractive index at 20 C. was 1.4490 and density at 20 C., 0.989.

(End of Chemist's report)

ZIRATOL AND IPANA TOOTH PASTE—NOT ACCEPTABLE FOR ACCEPTED DENTAL REMEDIES

The Council has authorized publication of the following report.

SAMUEL M. GORDON, *Secretary.*

One of the favorite technics of modern patent medicine advertising is to catch the eye of the reader or the ear of the listener by an appeal to fear. In the last decade, this technic served as the heavy artillery for much tooth paste advertising. In line with this technic, there was invented such slogans as "4 out of 5," "film," "acid mouth," "more than a tooth paste," and others, including "pink tooth brush."

"Pink tooth brush," the heavy artillery in Ipana Tooth Paste advertising, belongs in the category of "fear advertising." "Pink tooth brush" appears to be a disease, if such a term may be used, which may have been born, nurtured and nourished in advertising

offices and by periodicals that have not yet learned that the functions of a tooth paste are limited to its aid in the mechanical cleansing of the surfaces of the teeth. Almost every current advertisement for Ipana Tooth Paste carries the "pink tooth brush" appeal. Following the advertisements, one begins to believe that "pink tooth brush" would separate otherwise happily married couples and bring about differences between the old and new generation. Hardly anyone is immune for "even the bold and hardy can get 'pink tooth brush,'" or one "agile enough for a 100-foot jump" on skis can be caught by "pink tooth brush" just the same. Golfers were no more immune than yachtsmen and skiers for "'Pink Tooth Brush' is *no* respecter of persons!" whether one has a chauffeur or one walks to work.

Following the many advertisements of Ipana further, one learns that the crux of the situation is in "our preference for *soft foods,*" which are "certainly not conducive to healthy hardness of the gums"; for those gums of yours have "been growing lazier and flabbier with each year." But there is hope! No one should take chances with "pink tooth brush" which, we are told, is "an open invitation to gingivitis, to Vincent's disease, even to the much dreaded but less frequent pyorrhea." "More serious still, it is the first step towards infection at the roots of teeth which today look so healthy and sound and white. Which means the possible loss of those teeth," but hope is in the offing for those who would shun "pink tooth brush"; "Get a tube of Ipana Tooth Paste. Clean your teeth with it in the regular way. But each time you clean them, put some additional Ipana on your brush or finger-tip, and *massage it lightly into those soft gums of yours.*"

This apparently is based on the opinion held by some dentists that the use of "soft foods" is a possible cause of abnormal gum conditions or caries, but they have not suggested that the remedy lies in a tooth paste. The remedy, according to the proponents of the theory, lies in more thorough chewing and the use of harder foods. Incidentally, while the theory holds an element of truth, it has not been thoroughly established. J. Sim Wallace, who is probably the outstanding exponent of the cleansing effect of hard fibrous food, is quoted as stating: "Why worry about pits and fissures, defects and drugs, *dentifrices* and *toothbrushes,* if a diet which is admittedly the best for general health will effectively prevent caries?"

Except as an advertising catch-phrase, the term "pink tooth brush" is so ridiculous that comment on it should be wholly unnecessary. Suffice it to say that there is no recognizable clinical entity in dentistry known as "pink tooth brush." It is true that in the act of brushing the teeth, blood may appear on the toothbrush, but this may be or may not be serious.

There is no carefully controlled evidence, as far as the Council is aware, that a tooth paste containing beta-naphthol and soap, as found in Ipana, will prevent or overcome Vincent's disease, gingivitis, pyorrhea or infection at the roots of the teeth. No evidence has come to hand that massaging with Ipana Tooth Paste is more effective than massaging of the gums with the finger alone, or that a tooth paste is at all necessary in this respect. Many dentists suggest massaging the gums with the finger when certain forms of gum disease are present, but Ipana, or any other tooth paste, is not necessary for satisfactory massaging. Tishler has rightly urged: "A toothbrush, properly used, will maintain gingival health indefinitely, without the use of powder, paste or mouthwash. It is a simple, nonspectacular agent."[1]

Advertising states: "There's Ziratol in Ipana—the same Ziratol modern dentists use for toning and stimulating the gums back to healthy firmness." The public is told that Ipana contains Ziratol, "a hemostatic and antiseptic used by the foremost specialists to prevent and treat gum disorders."

Advertising to dentists states that Ziratol is "widely and successfully employed in

1. Tishler, Benjamin: Periodontia-Gingival Stimulation, Bull. Chicago D. Soc., 14:22 (March 29) 1934.

treating Gingival Disorders." It is stated that it "most nearly meets all the requirements of an ideal corroborant" and that, "Ziratol is an important ingredient of Ipana and because of its tonic, invigorating properties, many dentists regularly use Ipana in their prophylactic work at the chair and in teaching their patients the correct technique of gum massage." What is ziratol, which appears to be the backbone of Ipana's "pink tooth brush" remedy? Writers of modern textbooks on gingival diseases do not devote any space to ziratol as an agent in treating gum diseases.

Ziratol is a patent medicine; i.e., a product of undeclared composition which can be obtained by the public at patent medicine counters without a written order from a dentist or a physician. No statement of composition appears on the labels of the specimens of ziratol examined further than—

AN ACTIVE
ANTISEPTIC
AND GERMICIDE
Prepared from a
Phenol of the
Naphthalene Series

Water	41% Wt.	inert
Glycerine	25% Wt.	

This statement is included no doubt to comply with the Federal Insecticide Law. A qualitative or quantitative statement of the "active" ingredients does not appear. The label also states, under "Medical and Dental Uses," "Ziratol has a wide field of usefulness in the practice of Medicine, Surgery and Dentistry. See accompanying circular." The circular which accompanies the trade package states, "The field of usefulness of Ziratol because of its many superior properties, is unlimited. It is widely used in the general practice of medicine, and in special fields of medical work such as dentistry, surgery, gynecology and obstetrics. . . . A complete catalog of its uses would fill many pages. . . ." For dental uses, the advertising states, "For Disinfecting Instruments— . . . in a 10 % solution . . ." for "Exodontia," and for the treatment of "Root Canals." This information and other information goes directly to the public.

Other advertising states that Ipana contains, among other things, ". . . the new hemostatic antiseptic—Ziratol."

Ziratol was examined by the American Medical Association in 1917. At that time, the essential composition by weight was reported as follows:

Alphanaphthol	18%
Soap	20%
Glycerine and water sufficient to make	100%

It was further claimed to have a phenol coefficient of 13.66, but independent investigators found the phenol coefficient to be approximately 3.0 by the Hygienic Laboratory Method. At about that time, the U. S. Dept. of Agriculture Insecticide and Fungicide Board cited ziratol for misbranding. In commenting on this, the American Medical Association report stated ". . . the Bristol-Myers Company has abandoned a definite but false claim of high germicidal power—a claim which subjected the firm to Federal prosecution—and has submitted therefor indefinite statements which do not define the actual germicidal efficiency of Ziratol."

As late as 1929, the following indefinite statement of composition appeared in advertising:

Water	32% (Wt.)	Inert
Glycerine	30% (Wt.)	

and ziratol was stated to "destroy the cause," whatever that may be. This information is reported because, as will be seen from the statement of inert ingredients on the label and the more recent examination, the composition of ziratol has again been changed.

The examination of specimens of ziratol purchased on the open market in the latter part of 1930 showed the product to have the following essential composition:

Betanaphthol	10% (Wt.)
Soap	24% (Wt.)
Glycerine	26% (Wt.)
Water sufficient to make	100%

Thus, not only has betanaphthol been substituted for alphanaphthol, but the amount has been reduced by one-half, and the water has been increased, while the glycerine has been decreased. (In this connection, it is pertinent to point out that Accepted Dental Remedies, 1934 lists as a dosage form for alphanaphthol a compound solution of alphanaphthol sold under the name of "Alpha-Naphco," Alpha-Naphco is said to contain:

Alphanaphthol	10 gm.
Glycerine	32 gm.
Soft soap	23.8 gm.
Water—to make 100 gm.	
Flavored with glucin and essential oils	

This is reported by the Hygienic Laboratory Method to have a phenol coefficient of 1.42. The composition is declared and the advertising claims have been submitted for review. Thus, the practitioner who desires a ready-made solution of alphanaphthol has available such a preparation of nonsecret composition.)

In view of the foregoing, Ziratol and Ipana Tooth Paste are declared inadmissible to Accepted Dental Remedies; i.e., because a statement of composition for Ziratol does not appear on the label (Rule 1); it is advertised to the public and to the profession with unwarranted therapeutic claims (Rule 6); the name does not express the composition of a mixture of readily available materials (Rule 8), and Ipana is a dentifrice which is advertised to the public and to the profession with therapeutic claims in conflict with the provisions of the Council for dentifrices and it contains ziratol, another unacceptable proprietary of secret composition.

The Council again desires to point out that the functions of a dentifrice are limited to its aid in mechanically cleaning the surfaces of teeth, when used in connection with a toothbrush. A toothpaste or tooth powder cannot be expected on the basis of the available evidence to prevent or inhibit pyorrhea, gingivitis or other gum diseases. Treatment of such conditions belongs to the dental office or clinic.

DILLARD'S ASPERGUM—NOT ACCEPTABLE FOR A.D.R.

The Council considered Dillard's Aspergum in 1931. The following report which was prepared at that time was adopted and authorized for publication by the Council. Publication of the report was postponed primarily because of pressure due to the consideration of other products.

Recently, the Council's attention was directed to advertisements for Dillard's Aspergum in such publications as *Oral Hygiene* and *Dental Survey*. These advertisements bore the Seal of Acceptability of the Council. The attention of the firm was directed to this unwarranted use of the seal. Its use in connection with an advertisement even inadvertently gives misleading information to the profession.

In order that the profession may be properly informed on the status of Dillard's Aspergum, as far as the Council is concerned, the following report is presented.

SAMUEL M. GORDON, *Secretary*.

The Council has pointed out the inherent dangers in the questionable tendencies toward

arousing public interest in the matter of the promiscuous and unsupervised use of hypnotics.[1] Not less questionable is the practice of some manufacturers who promise to the public relief from aches due to rheumatism, headaches, colds, lumbago, toothache and other ill-defined conditions to which the human body is heir. At the present time, very many potent drugs are being freely dispensed to any who may ask for them. Unfortunately for the public health and safety, not only is the number of such increasing, but also their potency. The responsibility for this may be laid in part at the door of magazine and newspaper publishers who accept such advertising. The greater responsibility lies with the manufacturer who rejects the "ethical" method of advertising only to physicians and dentists, and does not scruple, apparently for the sake of vastly increased profits, to advertise his wares directly through newspapers, billboards, bus and trolley placards and in the pages of the medical and the dental journals that are careless regarding the type of advertising which they carry. Such, for example, is the history of Bayer's aspirin,[2] nothing more or less than the acetylsalicylic acid of the U. S. Pharmacopeia, sold, of course, at a higher price than when purchased under its official name.

An illustration of the extremes to which drug purveyors go in intensifying and popularizing the aspirin taking habit is furnished by Dillard's Aspergum, put out by the Health Products Corporation, Newark, N. J.

Dillard's Aspergum is stated to contain 3.5 grains of aspirin per tablet. It is sold directly to the public and, more ideally for the promoter, through clinical samples furnished to the dentist for handing out to the patient. Of course, each "clinical sample" is accompanied by a circular with directions "for relief from all aches or pains for which aspirin is commonly supplied by physicians . . . for irritated throats or smokers' throats, after tonsil removal, for head colds, simple headaches, in simple neuralgia." From the foregoing, it must be assumed that the general public is thoroughly aware of all the aches and pains for which the physician prescribes aspirin; and thoroughly aware of the intricacies of posttonsillectomy treatment and of the diagnosis of simple neuralgia, conditions which, for the best interests of the public, require professional care. It must be remembered that drugs act as two-edged swords. For example, the salicylates are effective in some cases of rheumatic fever, but, in atypical, subacute and muscular rheumatism, lumbago, etc., their action is much less certain. In such cases, only qualified physicians can prescribe on an individual basis, which is the goal of all rational therapeutics.

Curiously enough, while Aspergum is distributed to dentists as "clinical samples," no reference is made to dental conditions. It is thus palpable that the dentist who passes out these samples is unwittingly being made to serve as an advertising medium for a preparation whose promiscuous use by the public cannot be condoned.

The Council declares Aspergum inadmissible to A.D.R., because it represents an unessential modification of an official drug (Rule 10), and because it is marketed to the public for conditions which require proper professional care and not self-medication, directly to and through the dental profession (Rules 3 and 4). The Council desires to point out that self-medication with potent drugs cannot be considered in the interests of the public health.

1. Uses and Abuses of Barbitals: Report of the Council, J.A.D.A., 18:152 (Jan.) 1931.
2. Compare Health (May, 1930), issued by the New Hampshire State Board of Health.

A CLASSIFICATION OF LOCAL ANESTHETICS IN A·D·R

I. THOSE WHICH CAUSE ANESTHESIA BY THE PRODUCTION OF COLD

a. Ethyl chloride
b. Methyl chloride

II. THOSE WHICH HAVE A SPECIFIC EFFECT ON THE SENSORY NERVES.

A. SOLUBLE

1. *Primarily used for mucous membrane anesthesia:*
   a. Benzyl alcohol
   b. Butyn
   c. Cocaine
   d. Procaine base
   e. Tutocain
2. *Primarily used for injection anesthesia:*
   a. Apothesine
   b. Procaine borate
   c. Procaine hydrochloride

B. SLIGHTLY SOLUBLE, AND SUITABLE THEREFORE FOR WOUNDS AND MUCOUS SURFACES

a. Ethylaminobenzoate.

This and the chart on the opposite page are a part of an exhibit of the Council on Dental Therapeutics presented at the St. Paul Session, Aug. 6-10, 1934.

DRUGS USED IN TREATING VINCENT'S INFECTION

Ulceromembranous

Gingivitis

OXIDIZING AGENTS

Chromium Trioxide (?)
Hydrogen Peroxide - 3%
Sodium Perborate (?)
Potassium Permanganate

DYES

Pyridium
Acriflavine
Brilliant Green
Crystal Violet

MISCELLANEOUS

Soap
Tincture of Benzoin

ARSENICALS, ETC.

Liquor Potassium Arsenate (Fowler's Solution)
Arsphenamine
Neoarsphenamine
Bismuth Sodium Tartrate

ASTRINGENTS ESCHAROTICS, ETC

Chromium Trioxide
Copper Sulphate
Iodine
Mercuric Chloride & Mercurials
Silver Nitrate
Trichloracetic Acid

THESE ARE TO BE FOUND IN:
"ACCEPTED DENTAL REMEDIES"

BUREAU OF PUBLIC RELATIONS

OPERATIVE RADIODONTIA FOR THE CHILD PATIENT*

By WALTER S. THOMPSON, D.D.S., Los Angeles, Calif.

TO the specialized operative procedure and the practice of making successful radiodontic surveys, I give the name operative radiodontia. As such, it involves the selection of the modern dental x-ray unit, its adjustments, the generation of roentgen rays and their application in all phases of interest to the dental profession. Operative radiodontia also includes each step necessary in the production of finished roentgenograms of the teeth,

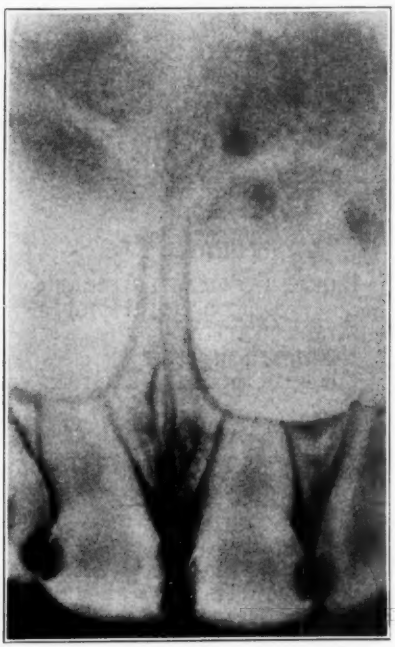


Fig. 1.—Periapical survey of child patient's maxillary central area.

Fig. 2.—Periapical survey of child patient's left maxillary cuspid area.

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Sixth Annual Session of the American Dental Association, St. Paul, Minn., Aug. 8, 1934.

their supporting tissues, adjacent areas and associated parts.

There is not one step in the practice of dentistry at which the obligation to the patient is greater than in the production of a roentgenogram portraying the actual conditions existing on, within and beneath the surface tissues of the oral cavity. Owing to a lack of soft-tissue resiliency and to soft-tissue displacement, there is a limit to the comfortable toleration of the film packet within the mouth. Too much stress cannot be laid on the necessity of adopting certain simplified and specialized operative procedures which insure a definite result—to be looked for, worked for and attained.

Fig. 3.—Periapical survey of child patient's left maxillary molar area.

These operative procedures should include all operations necessary to make a complete roentgenographic survey of the head and face; and they should include, furthermore, a degree of refinement and efficiency of a highly developed professional nature which will enable the dentist to repeat, indefinitely, his successes and to correct his failures. Involving, as they do, the possibility of subjecting the soft tissues of the mouth to traumatism and to chemical and bacterial invasion, as well as the necessity of subjecting the patient to high voltage electrical current and to penetrating radiation, these procedures immediately become an operative dental problem. As such, they should be performed in the dental office by a legally licensed dental surgeon, or else under his supervision.

Of the 36,000,000 school children in the United States, there are many seriously handicapped by some form of dental disorder, conservative estimate placing the number of those dentally neglected until the hour of need at 2,000,000. Child dentistry, in which child radiodontia should play an important part, is therefore one of the most pressing problems facing the dental profession today.

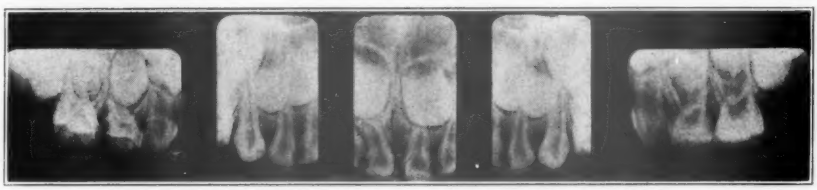


Fig. 4.—Periapical survey of child patient's maxillary teeth.

That which has heretofore been written concerning radiodontia has been based upon the medium-sized, middle-aged patient. Too little attention has been devoted to the child patient, both in operative and in interpretative radiodontia. As the result of careful research, there has been so much progress made in solving the problems of child radiodontia that it is now possible for the dentist to extend roentgenographic service to the child patient with self-confidence and ease.

The small patient may be led by tactful understanding and patient effort to entrust himself willingly to the dentist for

the making of a complete roentgengraphic survey of the head and face; and his interest in the procedure may be so stimulated that he will retain not a distasteful but a pleasant recollection of the experience.

SELECTION OF INTRA-ORAL FILM PACKET FOR THE CHILD PATIENT

Because of the comparatively small space in the child's mouth to accommodate and manipulate the film packet, it is advisable when making intra-oral exposure of the child patient, to use the new small-sized film packet No. 0, which, with its round corners and soft pliable margins, meets the intricate requirements of the child patient.

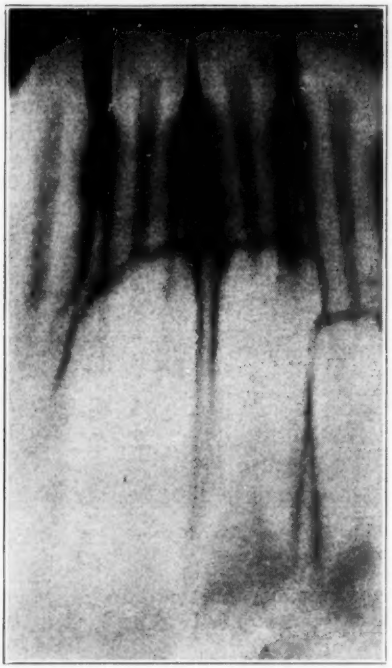


Fig. 5.—Periapical survey of child patient's mandibular central area.

Films requiring intermediate or fast exposure times may be found advantageous in child radiodontia, since it is frequently difficult to keep the patient quiet for a sufficient length of time to make a long exposure.

Fig. 6.—Periapical survey of child patient's left mandibular cuspid area.

Fig. 7.—Periapical survey of child patient's left mandibular molar area.

SEATING THE CHILD PATIENT FOR ROENTGENOGRAPHIC EXPOSURE

The usual method of seating the 3 or 4 year old patient in the dental chair should be dispensed with since it is impossible to stabilize the small head while it is resting against the broad back of the dental chair. In the absence of a modern junior dental chair, a wooden board 1 foot in width and 2 feet in length may be rested upon the arms of the dental chair and the patient seated upon the board. The back of the dental chair and the headrest should then be adjusted to support the patient with body and head erect.

When the child patient has been seated

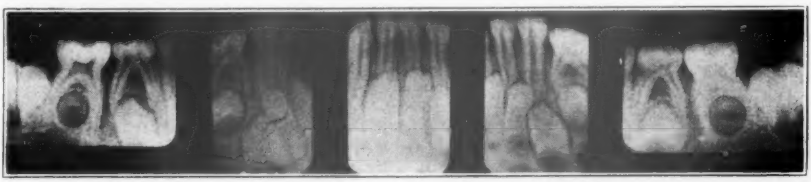


Fig. 8.—Periapical survey of child patient's mandibular teeth.

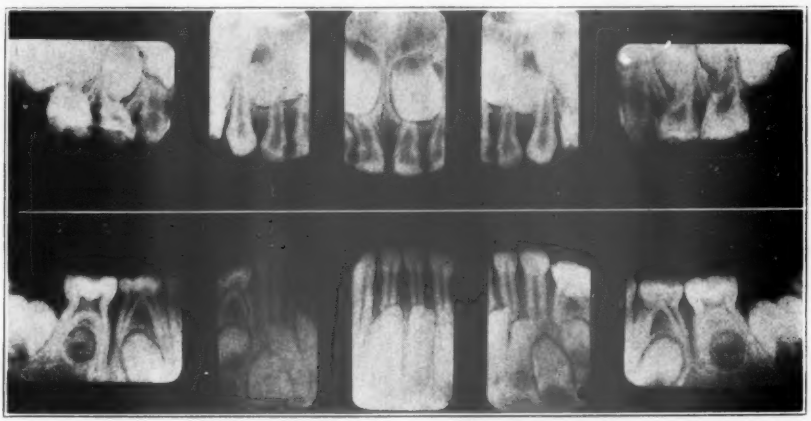


Fig. 9.—Ten-exposure periapical survey of child patient's teeth.

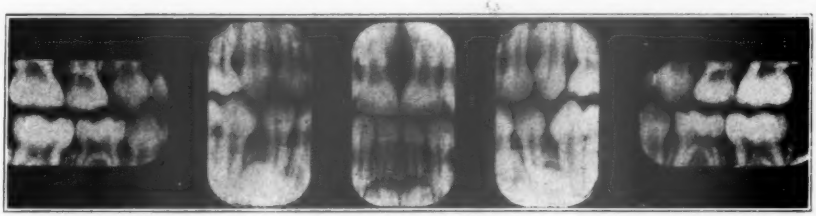


Fig. 10.—Interproximal survey of child patient's teeth, No. 0 bite-wing film packets being used.

in this manner, the same operative procedure may be adopted for him as that advocated for the adult patient.

PERIAPICAL EXPOSURE OF CHILD'S MAXILLARY TEETH

After the clinical examination of the child's mouth, the median line of the face is set vertically and the occlusal planes of

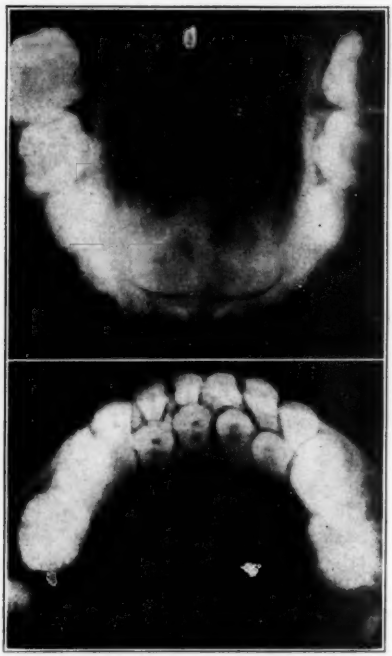


Fig. 11.—Incisoclusal survey of incisal edges and occlusal surfaces of the teeth and cross-section of dental arches of a child patient.

the teeth under roentgenographic survey are adjusted to a horizontal position. An intra-oral film packet No. 0, previously relieved of stiffness, is then carefully placed in a vertical position just behind the two maxillary central incisors. Since the child cannot be expected to refrain from moving during the exposure, the child's nurse or the parent should be requested to hold the film packet in position.

The x-ray tube is adjusted to 40 degrees superior angulation and placed at right angles to the maxillary central area, with the point of the cone directed to a point one-half inch above the tip of the nose. An exposure of two seconds is then made.

A second exposure of one and one-half seconds is made of the right maxillary lateral incisor and cuspid with the film in a vertical position. A similar exposure of the left maxillary lateral incisor and cuspid is made with the x-ray tube adjusted to 45 degrees superior angulation and placed at right angles to the maxillary cuspid area, with the point of the cone directed to a point on the alae-tragus line immediately behind the base of the nose.

Finally, an exposure of two seconds is made of the right maxillary molar area with the x-ray tube adjusted to 30 degrees superior angulation and placed at right angles to the right maxillary molar area, with the point of the cone directed to a point 1 inch below the center of the zygomatic arch and to the film packet, occupying a horizontal position behind the right maxillary molars. A similar exposure is made of the left maxillary deciduous molars.

These five exposures complete a panoramic periapical roentgenographic survey of a child's maxillary teeth.

PERIAPICAL EXPOSURE OF A CHILD'S MANDIBULAR TEETH

When the soft tissues forming the floor of the child's mouth have been adapted to gentle pressure, a No. 0 film packet is relieved of stiffness and carefully placed in a vertical position behind the two mandibular central incisors. The film packet is retained in position by pressure of the index finger of the child's nurse or the

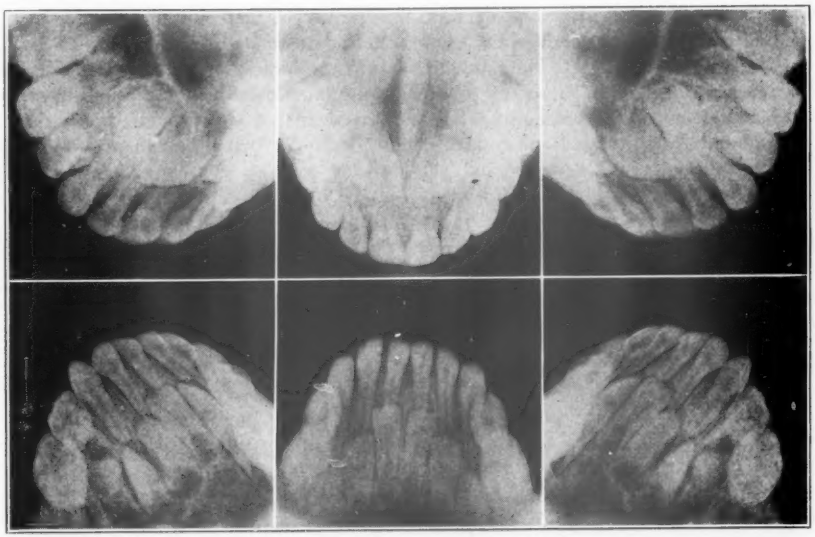


Fig. 12.—Incisoclusal periapical diagnostic data on child patient's upper and lower teeth.

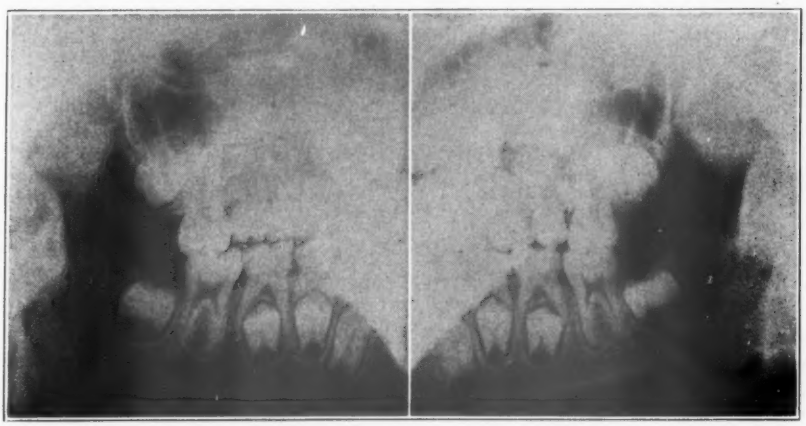


Fig 13.—Right and left lateral maxillomandibular surveys of child patient on single film.

parent. An exposure of one second is made after the x-ray tube has been adjusted to 15 degrees inferior angulation and placed at right angles to the mandibular central incisor area, with the point of the cone directed to a point one-half inch above the point of the chin.

An exposure of one second is then made of the right mandibular, lateral incisor and cuspid with the film occupying a vertical position in the mouth. The x-ray tube, previously adjusted to 20 degrees

inferior angulation, is placed at right angles to the right mandibular cuspid area, with the point of the cone directed to the center of the film packet.

A similar exposure is made of the left mandibular, lateral incisor and cuspid.

To roentgenograph deciduous molars, a film packet is placed behind the right mandibular molars in a horizontal position. The usual exposure of one and one-fourth seconds for a small sized face is

Fig. 14.—Profile roentgenogram of child patient. (Courtesy of Gustav Korkhaus.)

made at 5 degrees inferior angulation with the x-ray tube set at right angles to the right mandibular molar area. A similar exposure is then made of the left deciduous mandibular molars.

These five exposures complete a panoramic periapical survey of a child's mandibular teeth. Thus, ten exposures constitute a complete periapical survey of a child patient's teeth.

For a child 12 years of age or more, the usual fourteen-exposure periapical survey is recommended.

Because of the detrimental biologic effects of the roentgen rays, the child's nurse or the parent—not the dentist or the dental nurse—should assist in the retention of the film packet in the mouth during each exposure. To assure a sanitary condition, the hands should be bathed preparatory to being placed in the child's mouth.

INTERPROXIMAL EXPOSURE OF THE CHILD PATIENT'S TEETH

Incipient decalcified areas on the proximal surfaces of a child patient's teeth may be detected as readily and with as much ease as on those of an adult. For this type of exposure, bite-wing films are used and the roentgen rays projected at 10 degrees superior angulation from a position at right angles to the teeth under survey and to the film. One and one-half seconds exposure is required for the anterior areas and two seconds exposure for the posterior areas of the dental arches.

INCISOCLUSAL EXPOSURE OF THE CHILD PATIENT'S TEETH

It often becomes necessary in the practice of child dentistry to record an occlusal aspect of a child patient's teeth and a cross-section of the dental arches. For this purpose, incisoclusal exposure is recommended.

EXTRA-ORAL RADIODONTIA FOR THE CHILD PATIENT

Extra-oral exposure of each individual bone or of all the bones of the head and face may be made as easily for the child patient as for the adult.

Roentgenograms resulting from this type of exposure are extremely valuable

for reducing the number of intra-oral exposures; for finishing the roentgenographic survey after unpleasant complications arise, and for portraying a larger area than the small intra-oral films will permit.

Stereoroentgenographic views may be made of the child patient by obtaining right and left eye views of any desired area of the head and face by periapical, interproximal, incisoclusal or extra-oral exposure.

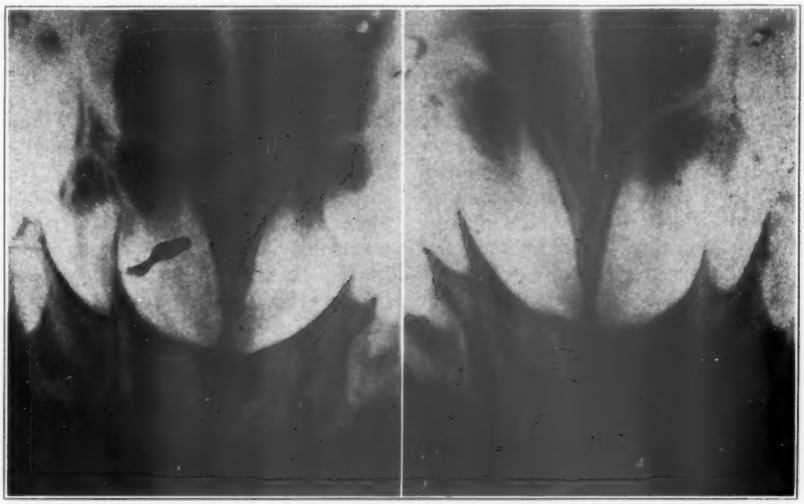


Fig. 15.—Stereoroentgenographic views of child's maxillary central area.

THE CARE OF CHILDREN'S TEETH*

MOST mothers and fathers want their children to be happy and healthy. Most parents are ready and willing to make decided sacrifices in order to provide their children with all the necessities and some of the luxuries of life. Particularly is this instinctive feeling expressed toward babies and little children, who, because of their helplessness, are absolutely dependent on adult care. How often have you heard a mother wish, when her child was suffering from disease or accident, that she could change places with the little sufferer. Yet there are some instances in which the little one's suffering is the result of parental carelessness or neglect. All too often, carelessness or neglect in caring for children's teeth causes unnecessary pain, discomfort and sometimes serious illness.

Few parents realize or appreciate the changes, growth and developmental activity that normally occur in the mouth of a growing child. From birth until early adulthood, the human jaws are a veritable beehive of growing, erupting, absorbing, shedding and calcifying teeth.

*A talk to be given before parent-teacher associations, women's clubs, etc.

How many parents know the approximate age at which the twenty different baby teeth should be shed and replaced by their permanent successors? Very few indeed. Yet this physiologic change is of utmost importance in the life of the child. A baby tooth that is supposed to fall out at the age of 6 should not, ordinarily, be allowed to remain in the child's mouth until the age of 10. The baby tooth that is supposed to remain in the child's mouth until the age of 10 should not, ordinarily, be removed at the age of 6. The prolonged retention of baby teeth is just as harmful as their premature loss. Both conditions may produce crowding, crookedness or protrusion of the teeth, improper development of the jaws and disharmony of the facial features. The early detection and correction of faulty dental conditions by the family dentist will more than remunerate the parents in satisfaction, pride and happiness. Nor will the parents be remunerated in satisfaction alone: If the child's teeth are well formed and well spaced, parents will be saved the expense, time and inconvenience associated with orthodontic or tooth-straightening procedure.

Time and again, dentists are greeted with this reproachful expression by the mother: "Why, Doctor, I thought that was only a baby tooth, and that it would fall out anyway; so I didn't think it was necessary to have it cared for." Where did mothers acquire the idea that baby teeth can be neglected because some day they will fall out? Surely not from an authoritative source. Such an impression is very erroneous, and the sooner parents realize the gravity of their mistake, the better it will be for both parent and child.

Children are supplied by nature with twenty baby teeth, ten in the upper jaw and ten in the lower jaw. These teeth are arranged in a certain way for a definite purpose. Each of these twenty teeth is supposed to remain in the child's mouth a certain length of time and each tooth is supposed to perform definite functions. Parents should give these important organs the same care and attention that they give their child's hair, fingernails and skin. Ordinarily, mothers keenly resent any criticism induced by a child's shabby appearance, such as unkempt hair or an unclean face. How many mothers resent criticism based on the child's unclean, defective teeth? Unfortunately, all too often, mothers are indifferent to the child's dental condition simply because they do not know the importance of the masticating organs.

The functions of the teeth are at least fourfold: to chew food; to assist in speech; to assist in facial development and expression and, in the case of baby or deciduous teeth, to serve as pathfinders and space preservers for the succeeding permanent teeth.

The premature loss of the baby teeth may cause the permanent teeth to come in crooked. This often leads to faulty occlusion or malocclusion. In other words, it may prevent the upper and lower teeth from coming together properly. Malocclusion interferes with mastication; which overtaxes the stomach and may lead to stomach trouble. Crooked and irregular teeth are hard to keep clean; therefore, they are more susceptible to decay.

Decayed and infected teeth not only cause pain and inconvenience: they are often the cause of many serious systemic diseases, such as heart trouble, rheumatism, appendicitis and digestional disturbances. These diseases may be caused by the poisons produced by germs that grow within the cavities of bad teeth and about the roots of infected and abscessed teeth. These germs or the poisons which

they produce may be carried to other parts of the body by the blood stream. Dental defects should be corrected while they are still small or at least before the decay reaches the pulp or nerve in order that the teeth may not act as sources of infection for the rest of the body.

One of the grave mistakes which many parents make in regard to children's teeth is the lack of care of the first permanent or "sixth year" molars. These teeth come into the mouth when the child is about 6 years of age. They do not take the place of any baby teeth, nor are they ever replaced by other natural teeth. They are supposed to remain in the mouth permanently; hence, the name, first permanent molars.

Every child has four first permanent molars, one on each side of the upper jaw and one on each side of the lower jaw. By interlocking with one another, the upper and lower first permanent molars help determine the shape of the lower one third of the face. Their location affects the position and alinement of the permanent teeth, which erupt later in the child's life. The loss of one first permanent molar markedly alters the shape of the mouth; yet of all the permanent teeth, the first permanent molars suffer most from neglect. This is probably due to the fact that most mothers mistake the first permanent molars for baby teeth and that many mothers think that baby teeth do not need attention. Thus, the first permanent molars, erupting as they do several years before the baby molars are normally lost, are often allowed to suffer the unenviable lot of the baby teeth—decay, infection and extraction.

Children's teeth should be examined and cleaned by a dentist regularly at least every six months. In fact, some children, because their teeth are susceptible to decay, should visit the dentist every three or four months. In this way, any defects that might be present can be discovered and corrected while they are still small, and thus future trouble and expense be prevented. If the child is under periodic observation, the dentist can prevent and correct many dental irregularities with little or no pain to the child and without subjecting either the child or himself to unnecessary nervous tension. Regular visits to the dentist enable the child to become accustomed to the environment of a dental office. Any fear that he may have had is replaced by a feeling of friendly confidence, which, in many instances, lasts for years after adulthood has been reached.

Not infrequently, it is reported that the teeth of children living in certain institutions are much better than the teeth of children living in their own homes. For instance, several years ago, Dr. Trim Houston, of Corsicana, Texas, reporting on the dental conditions of children in an orphanage with which he was connected, stated that, in seventeen years, 508 children needed 1,131 fillings in permanent teeth. In other words, the number of cavities per child was 1.5. More recently, the chief of the dental staff of the Marks Nathan Jewish Orphan Home in Chicago stated that, in the past ten years, 3,000 children in that institution have been given dental care. The average number of cavities in both the permanent and the baby teeth was less than 1 per child. He further reported that children in that institution rarely, if ever, lose a first permanent molar and that, as a rule, the children rarely have crooked teeth.

In direct contrast to this condition, a dental survey made in 1928 disclosed that 96.4 per cent of Chicago school children had decayed teeth averaging about five cavities per child, and a similar survey conducted in St. Louis in 1933-1934 re-

veals that 95 per cent of the school children in that city have one or more defective teeth.

It cannot be supposed that children living in institutions have inherited stronger constitutions than children who live under their own roof. On the contrary, it is only reasonable to believe that, as a rule, orphans may have inherited poor constitutions and therefore may be more susceptible to dental decay than are other children. The difference between the dental conditions of the children in the institutions just mentioned and that of the average children is probably due to systemic care and the regime characteristic of most modern institutions. The children are given simple, plain, but wholesome fare. They are not allowed to overindulge in sugars and other sweet foods. Regular hours are insisted on. The health of the charges is entrusted to people whose business it is to keep children well. Mouth hygiene is insisted on by the house mothers, and, in the modern institutions, the children receive a thorough dental examination and care at regular, stated intervals.

Unfortunately, most children living at home are not subject to the same rigid regime. Individual appetites are catered to. Often, plain simple food is superseded by knicknacks and pastry. Habits of mouth hygiene are overlooked and, in some instances, ignored; and children living at home are rarely compelled to visit the dentist regularly, if at all. In fact, we can almost say that it is the rule and not the exception that the average child is taken to the dentist only after many painful hours and perhaps sleepless nights caused by an aching, pulsating tooth. In such cases, dental care is sought all too late because the dentist cannot do more than alleviate the pain by either medication or extraction.

Parents should not wait until the child complains of toothache before taking him to the dentist. They should form the habit of taking the child to the dentist at least every six months. In fact, some children, because of the susceptibility of their teeth to decay, should receive dental care every three or four months. Periodic dental care should be started when the child is 2½ or 3 years of age and should be continued throughout life. In this way, the dentist can be of real service to you and your family. In this way, the teeth of your children may be preserved with a minimum amount of dental care.

Children with good teeth are in a position to make better school grades than are children suffering from bad teeth. No child can concentrate on his school work when he is tormented by an aching tooth. Backward children are a source of worry to both parent and teacher—certainly their education is more costly to parent and taxpayer than is the education of normal children. Diseased, abscessed teeth may mean backward children.

Dr. Alfred C. Fones, of Bridgeport, Conn., one of the nation's pioneers in work on the hygiene of children's mouths, gives the following interesting figures:

In five years, from 1912, as a result merely of instruction in the schools of Bridgeport as to how to take care of the teeth, the percentage of bad teeth among school children was reduced by 33.9 per cent, or more than one-third. In 1912, 40 per cent of the school children of Bridgeport were behind in their school work, and in 1918 there were only 20 per cent retarded. In 1912, 42 per cent of the whole school budget was spent on children who were behind in their school work, and in 1918 only 17 per cent of the budget was expended for the schooling of such children. A saving in actual cash to the taxpayers of 25 per

cent of the school budget was brought about by the proper care of the children's teeth.

Children should be taught very early in life the fundamental habits of mouth hygiene. Parents should provide the child with small sized toothbrushes. If possible, the child should have two brushes, using one in the morning and one in the evening. The bristles of the brush should be set far enough apart so that they can be kept clean. They should be of medium stiffness and of uneven length. The child may use a good toothpaste or powder that does not contain any harsh grit or strong medicine that will injure the enamel or gums. He should be taught to brush his teeth at least twice a day—before or after breakfast and before going to bed at night. The following simple method of brushing the teeth is usually quite satisfactory for children:

Hold the jaws slightly apart. Brush the teeth of each jaw separately. Place the bristles of the brush on the gums above the upper teeth and brush down from the gums to the chewing surface. This downward movement brushes the food from between the teeth. It also massages the gums. Never brush *across* the teeth. This movement will not remove the food from the crevices and moreover it may injure the gums. The lower teeth should be cleaned in the same way as the upper teeth. The brush should be placed on the gums below the teeth and drawn upward to the chewing surface. Brush the inside surfaces of the teeth as well as the outside surfaces. Also brush the chewing surfaces of the teeth as their uneven surfaces easily catch and hold small particles of food. During the habit-forming period, parents should always inspect the child's teeth after each brushing to be sure that this duty has been properly performed.

It is quite generally agreed that diet influences tooth structure. Certain foods, especially if they are eaten during the tooth-forming years, help to build strong, decay-resisting teeth. Overindulgence in other foods seems to augment dental decay. Teeth are composed largely of calcium and phosphorus. Therefore, to build and keep sound teeth, we must eat plenty of foods that contain calcium and phosphorus. Milk and other dairy products, vegetables, fruit, wholegrain bread and cereals, meat and eggs provide the necessary minerals for teeth. Certain vitamins known as vitamins A, C and D are also necessary for good tooth construction.

Excessive use of sugar, candy and soft, rich pastries seems to be detrimental to teeth and to induce decay. Parents should never frighten children into obedience or good behavior by threatening to take them to the dentist. The practice of dentistry, even under normal conditions, subjects the conscientious and sympathetic dentist to great nervous strain. It is doubly hard to operate on a terrified child. Using the dentist as a bogie man —even the mischievous little joke regarding the real or imagined pain attendant on dentistry—makes a lasting impression on the plastic, sensitive mind of a child. Sometimes, these early fearful impressions so terrify children that they refuse to enter a dental office until driven there by unbearable pain. This, of course, not only causes unnecessary suffering, but it also may cause complications that undermine the physical health of the individual.

In conclusion, allow me to repeat: Mouth health is most important to general health and to happiness. Help your child to build and maintain good teeth by exercising intelligent care in the selection of his diet. Train him to clean his teeth properly, supervising the cleaning until you are certain that the training is com-

plete. Make your family dentist your child's dental advisor and friend, not a monster to terrify him into obedience. Care for your child's teeth when he is young, so that his teeth can care for him when he is older.

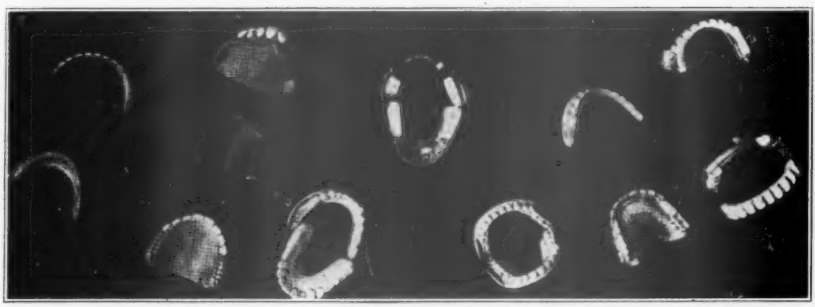
A CENTURY OF PROGRESS BOOKLET

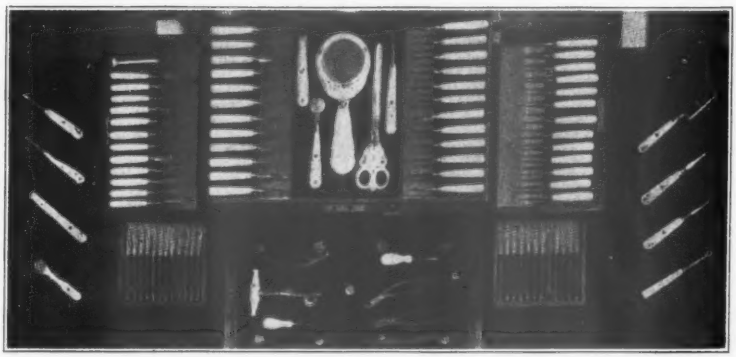
A 64 page booklet describing the dental exhibit which was displayed at the Century of Progress Exposition, Chicago, 1933-1934, has been prepared by Arthur D. Black. It portrays some of the problems of dental health and the prevention of dental disease. It also acquaints the public with the evolution of dentistry from a mechanical art to a highly efficient profession during the past century. The table of contents is as follows:

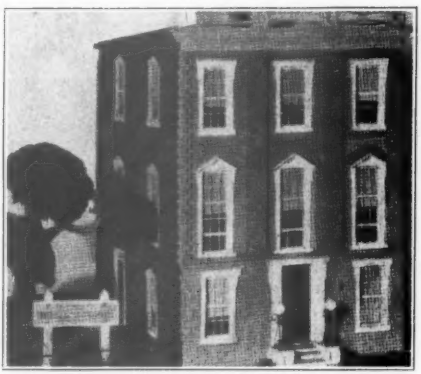
Foreword
Organizations Responsible for the Exhibit, with Officers and Boards
Dental Exhibit at the Exposition, General Description
Cover Design. Etymological Review of Word "Tooth"
A Century of Progress in Dental Practice
Bridgework, Ancient and Modern
The Talking Tooth
Cuneiform Tablets. Dentistry 2600 Years Ago
Dental Drills of the Past Century
Extracting Instruments of Early Days
Professional Dental Education
Dental Books. Early Publications, from 1530
Washington's Artificial Teeth
Foods in Relation to the Teeth
Nature, Builder of Teeth
Development of the Teeth. Wax Models
Mastication Exhibit
Changes in Facial Expression with Dentures. Face Masks
Facial Contours Changed by Orthodontia. Face Masks
Plastic Surgery of the Face. Masks
Puppet Show
Mural Paintings. The Profession Carries Dental Service to the Far Corners
Ivory Bracelets "Made to Order" in Southern Seas. The Wild Boar
Elephant Toothache. Sections of Tusks Injured by Rifle Balls
General Description and Photograph of the Exhibit
U. S. Government, Bureau of Standards, Tests Dental Materials
Bronze Tablets in Honor of Contributors to Profession's Progress
Dedication of Wells and Morton Tablets
Address by Hon. Henrik Shipstead
Anesthesia, Discoveries in This Field, Including Dentistry's Contributions
Gold Fish Used in Local Anesthetic Experiments
Syphilis of the Mouth, Wax Models
Cancer of the Mouth, Wax Models
Dental Instrument Cases of a Century Ago
Teeth of a Million Years Ago, Extinct Animals
Dental Paintings, Cartoons, Etc., from 17th, 18th, 19th Centuries
Sets of Artificial Teeth, 18th and Early 19th Centuries
Pyorrhea
Tooth Brushing
Devices for Cleaning the Teeth
Large Models Illustrating Tooth Decay and Pyorrhea
X-Rays in Dentistry. Illuminated Model
The Word "Tooth" in Various Languages
Contributors to Dental Exhibit Fund

COPIES OF THIS BOOKLET; LANTERN SLIDES

This booklet was published to supply material for public lectures on dental health. A limited number of copies are available and will be mailed on receipt of 10 cents to cover postage and mailing. Lantern slides can be supplied of the talking tooth (12 slides in colors), pyorrhea (12 slides in colors), the moving picture film (28 slides) and other illustrations in this booklet. Address Bureau of Public Relations, American Dental Association, 212 East Superior Street, Chicago.







Four of the eighty illustrations in the Exhibit for Dentistry booklet. Above: Early types of dentures. Center: Dental instruments of century ago. Below, left: denture worn by Washington; right: model of first building occupied by Baltimore College of Dental Surgery.

CURRENT LITERATURE

Incisor Teeth of Albino Rats and Guinea-Pigs in Vitamin A Deficiency and Repair (S. B. Wolbach and Percy R. Howe, Am. J. Path., May, 1933): The initial effect of a deficiency of vitamin A on the incisor teeth of rats and guinea-pigs is on the enamel organ. The ameloblasts respond earliest by atrophy, then the remainder of the organ atrophies, and finally metaplasia and calcification and, in the guinea-pig, ossification occur. Atrophy and depolarization of odontoblasts follow changes in the enamel organ. The odontoblasts survive longest on the side (labial) in apposition to the enamel organ. In long continued experiments, gross deformities in the incisors of rats resulted from absence or deficiency of dentin formation. Two types of denticle formation are described —one in which denticles are built up by depolarized odontoblasts, the other in which they are formed by inclusions of ameloblasts by the folding of imperfectly formed dentin at the formative end of the tooth. Defective formation of enamel and other poorly understood conditions in teeth, such as denticles, pulp bone and cementoexostoses, may reasonably be regarded as possibilities in vitamin A deficiency in man. Our observations indicate that in the incisor teeth of rodents the odontoblasts are influenced by the enamel organ throughout life. As in other morphologic problems concerning vitamin deficiencies, study of the sequences of repair was essential. We emphasize the importance of two types of control material, the normal and the progressive stages in repair. Our observations indicate that deficiency in vitamin A is the most important of the known vitamin deficiencies in its effect on the formation of teeth.—Abstr. *Am. J. Dis. Child.*, October, 1934.

Influence of Calcium and Phosphorus on Healing of Fractures (K. O. Haldeman and J. M. Moore, Arch Surg., September, 1934): Haldeman and Moore used monocalcium, tricalcium and dicalcium phosphate and calcium glycerophosphate in determining the effect of a local excess of calcium and phosphorus in the healing of fractures of the radii in seventeen rabbits. Healing was delayed in five and uninfluenced in seven; two rabbits died in the first week after operation, and in three, in which tricalcium phosphate was added, the healing was delayed on both sides, although complete union eventually resulted on the treated side, while the control defects went on to typical nonunion. The reason for this delay is not apparent. However, the conclusion seems justified that in certain cases of delayed union, tricalcium phosphate is an aid to union. None of the calcium and phosphorus compounds used in excess seemed capable of accelerating the normal rate of healing. In this respect, the results fail to follow the well recognized chemical law that increasing the concentration of the reacting substances speeds up the reaction. Because of this fact, it is probable that the process of ossification is more than the purely chemical equation which certain authors describe.—Abstr. *J.A.M.A.*, Oct. 27, 1934.

Vincent's Infection of Mucous Membranes: In Vincent's angina, do ulcers develop on any other membranes than the membranes of the mouth or throat? Are the organisms found in cases of infection in the vagina? All the books that I have which make reference to Vincent's infection speak only of the mouth and throat as the location of the ulcers. *Answer:* Fusospirochetal (Vincent's disease) infections of parts of the body other than the oral cavity have been described repeatedly. Davis and Pilot (Studies of Bacillus Fusiformis and Vincent's Spirochete, *J.A.M.A.*, Sept. 16, 1922, p. 944) reported a number of cases of a gangrenous condition of the penis presumably caused by these organisms. Cases of putrid gangrenous abscesses of the lungs and brain are even more numerous in the literature. A recent monograph (Smith, D. T.: Oral Spirochetes and Related Organisms in Fusospirochetal Disease, Baltimore: Williams & Wilkins Company, 1932) discusses this subject in great detail. According to Smith, most of

the reported fusospirochetal infections in the female genital region are of the gangrenous or noma type, rather than ulcerative, and are relatively rare. On the other hand, "Fusiform bacilli and spirochetes are commonly found about the clitoris of normal women but are usually absent in smears from the vagina. Women of the prostitute class become carriers of the infection." Balanitis in the male may be traced in many instances to cohabitation with women in the last group.—*J.A.M.A.*, Oct. 27, 1934.

Problems in Dental Pharmacy (A. O. Mickelson, J. Am. Pharmacol. A., September, 1934): Mickelson stresses the need of study by pharmacists of dental needs. He urges that such needs are numerous and offer a new field of possibility. The scope of dental pharmacy is shown by the work of the Council on Dental Therapeutics. He suggests a massing fluid for the abrasives used in the cleaning of teeth; tonics which will build tooth structure in fetal life and in children, such tonics to be used in conjunction with food and vitamin; a formula highly germicidal for dental instruments not toxic to oral tissues; a solvent for calcific deposits which the dentist might use with safety to the enamel, and a medicament for dry sockets.

Eruption of Teeth: In a child of 6, with all the deciduous teeth still firmly intact, the lower central incisors are beginning to erupt behind the deciduous. Is it necessary to extract the deciduous in order that the permanent may erupt properly? *Answer:* The deciduous teeth should always be extracted immediately when the permanent teeth are detected erupting behind them.—*J.A.M.A.*, Oct. 13, 1934.

Aphthae Resistentiae: Could you advise me of some new methods to try in treating a case of chronic aphthae, or periadenitis mucosa necrotica recurrens? The case I am treating is that of a woman about 25 years old. She has had the condition off and on for about fifteen years. At times, the lesions are numerous and severe and occasionally involve the vagina. She states that one of her children, a brother, her father and a grandmother are all afflicted with this disease. She gives a definite history of rheumatic fever and St. Vitus dance. *Answer:* As implied in the names, periadenitis mucosa necrotica recurrens, or aphthae resistentiae, is a difficult disease to treat, clearing at times with or without treatment but nearly always recurring. All authorities agree that it yields to arsenic more regularly than to any other drug. Ormsby has reported cases that cleared up with treatment with arsphenamine, but this drug failed in other cases. Howard Fox mentioned prompt improvement with roentgen therapy. Sutton, who originally described the disease in this country, used hygienic measures, outdoor sleeping, light exercise, easily digested, nourishing food in plenty, cod liver oil, iron and arsenic, with good effect. The latter drug is possibly responsible for most of the benefit. The disease is familial, as in the case under discussion, seems to have a nervous element in it and the mild lesions resemble ordinary canker sores. Whether it has any relation to the latter disease, or whether the resemblance to tuberculids mentioned by Fordyce in his discussion of Howard Fox's case means anything, has not been determined.—*J.A.M.A.*, Oct. 20, 1934.

Foreign Literature

Case of Progressive Facial Hemiatrophy Treated by Means of Prosthesis of Expansion (Hilmar W. Boe, L'Odontologie, September, 1934): Progressive facial hemiatrophy is a rare disease attacking persons generally between the ages of 8 and 20. It develops slowly and seldom attacks the whole face. The cause of the disease is unknown. Many theories have been propounded to explain it. The atrophy attacks the skin and the subcutaneous tissues. The eyebrows fall out or become white. The musculature of the face and the tongue are involved. Many treatments have been suggested, but none have proved successful. The author reported in detail a case which he observed over a period of years. He used an expansion prosthesis made of rubber. In several years, he changed the prosthesis four times. At the time the last apparatus was made, the con-

dition of the patient was greatly improved. The color of the skin and the lips was practically normal. The musculature was increased in volume and function. The patient's esthetic appearance was much better, while her mental state was decidedly improved.

Treatment of Malignant Tumors of Jaws (C. Julliard, L'Odontologie, Sept. 30, 1934): The author points out that the prognosis of malignant tumors of the jaws is very serious. The only way to improve this prospect is by early diagnosis and early treatment. He believes that the way to attain this end is to educate the public as well as the dental profession. Cancerous lesions occur at the age when other conditions are beginning to appear in the mouth and this keeps the patient from being suspicious of cancer. Carcinoma of the jaws is seen about three times more frequently than sarcoma. The forms under which carcinoma may appear are: ulcerations, vegetative forms and deep forms. Suggestions for diagnosis of each of these forms are given. If a clinical diagnosis is not clear, a biopsy is indicated. Roentgenography is also an aid in the diagnosis. Bone destruction is more or less extensive and must not be confused with destruction of inflammatory nature. The treatment may be radiologic or surgical or a combination of the two. The indications for each of these methods are given, with remarks on their technic. The author describes the prostheses he uses for immediate and late use after removal of the lesions. Sarcomas of the jaw may appear in the form of an epulis of the gums or osseous or para-osseous tumors. Sarcomas are radiosensitive, and roentgenotherapy is less often followed by recurrence than surgical removal. Sarcomas of the upper jaws which involve the bone should be surgically removed.

Biology of Root Canals in Human Teeth (Guido Fischer, Deutsche Zahnarztl. Wchnschr., 1933): Fischer notes the quantity of literature written on the topography of root canals, their various ramifications and the conditions around the apical foramina. There is no research done up to the present on the condition of the life of an overfunctioning or underfunctioning pulp. The investigations up to date treat only the pathologic changes in the pulp. Rebel and Feldmann included in their valuable work the conditions brought about by medicinal influences. The author examined the teeth of hundreds of people for a great number of years and found that, in the first period after tooth eruption, the pulp at the apical foramen is in close connection with the periodontium. In the later period, the apical foramen keeps on closing more tightly, and a mixed structure is formed there, which has no more the character of the purely embryonal pulp, but resembles and is identical with the fibrillar periodontal membrane. There results a congestion of the previously fluid interstitial material. Through this congestion, the pulp becomes cut off from its surroundings and establishes its own metabolic relations to the tooth. Under these conditions, the pulp has difficulties in its collateral circulation and lymph system. This condition exists a few years after tooth eruption. With advancing years, this congestion increases, resulting in *Hydrops pulpae* in senile teeth. The same changes are found in pulps of young persons with constitutional diseases, as in congenital syphilis, tuberculosis, avitaminosis and disturbances of internal secretions, since the close connection of the odontoblasts with the capillary system and all the disharmonies of the capillary circulation bring about disturbances in metabolism and osmotic pressure and result in atrophy of the odontoblasts. The fibrillar structure of the pulp becomes calcified. This calcification means a futile protection of the tooth from exogenic influences. As the periodontal membrane is the best nourished structure of the tooth, its resistance is great, even after the death of the pulp.

Choleostoma of the Jaws (W. Aronson, Ztschr. f. Stomatol., 1934): The author describes the clinical and pathologic pictures of the disease. He asserts that the etiology is not clear. Choleostoma of the jaws, especially of the upper, is rare. A diagnosis can be reached only histopathologically. *A priori,* a clinical diagnosis may be obtained only during operation by the

uncovering of a sac filled with a compact mother-of-pearl-colored asbestos-like mass. The treatment is surgical. A completely resorbed root together with an intact dental pulp is of very rare occurrence.

Unusual Anomaly of the Face in an Anencephalic Monster (B. Rating, Virchow's Arch. f. path. Anat., 288:223, 1933): In an anencephalic monster, 32 cm. in length, an accessory nose was situated between a double right eye and the root of the normal median nose. The upper lip, palate and maxilla were cleft. The maldevelopment is made the basis of a discussion of incomplete reduplication anomalies of the face.—*Am. J. Dis. Child.*, October, 1934.

Accessory Tongue (K. M. Menzel, Virchow's Arch. f. path. Anat., 288:253, 1933): Anomalies previously described as accessory tongue have been rounded masses in the floor of the mouth that contained cartilage or adipose tissue and that were attached to the body of the hyoid bone or to the septum of the tongue. They have had little structural resemblance to the normal tongue. Menzel carefully describes as accessory tongue two examples of a congenital anomaly that he claims has never been heretofore recorded. One was in a youth, aged 16, the other in a woman, aged 26. In each instance, the accessory tongue was about the size of a walnut. It exhibited spontaneous fibrillary and coarser contractions and had a papillary surface like that of the base of the tongue. In the boy, the mass was attached to the lower pole of the left tonsil. In the woman, it was attached to the right side of the base of the tongue; the right tonsil and faucial pillars were absent. In each case, the anomaly was associated with atresia of the external auditory canal, absence or maldevelopment of the external ear, maldevelopment of the middle ear and congenital paresis of the facial nerve, in each case on the same side as the lingual anomaly. The internal ear and labyrinth were functionally normal. Taste sensation of the accessory tongue of the boy was carefully tested and was found to be present and normal. Histologic examination of the structure after removal showed it to have a surface like that of the normal tongue, with filiform and circumvallate papillae and taste buds. The deeper portion of the mass consisted of striped muscle. Atresia auris associated with paresis of the facial nerve has frequently been described. These conditions are ascribed to defective development arising not later than the third fetal month in the region of the first and second branchial arches. Menzel believes that the accessory tongue described by him arose from multipotent tissue of this same region.—*Am. J. Dis. Child.*, October, 1934.

"The Michigan Plan"

Sentiment among members of the Michigan House of Delegates has changed completely, according to reliable reports, on the subject of the so-called Michigan Plan, referred to by Dr. Warnshuis* and outlined previously in these columns; also health insurance in general. It is altogether probable that the plan will be overwhelmingly rejected when it comes up for final vote this month.—*Minnesota Medicine.*

With reference to the above editorial wherein is mentioned the situation in Michigan, *Northwest Dentistry* wired for information on the action taken by the House of Delegates there and received the following reply: "Michigan Medical Society continued committee to carry on further investigation, but requested that no experiment with insurance plan be started at present." It looks as though the action of the A. M. A. House of Delegates at Cleveland had a sobering influence on the Michigan component. Defining a policy "in no uncertain terms" has thus helped the medical profession to know what it wants and we believe will have a wholesome effect on the dental profession.—*Northwest Dentistry*, October, 1934.

*See p. 2096, this issue.

NEWS

ARIZONA

Indian Service Physicians: The Indian office, Washington, D. C., has approved the recent organization of the Indian Service Medical Society at Winslow with the following officers: Hudspeth E. Scoles, Tuba City, president; Marshall E. Burgess, Oraibi, vice president, and LeRoy Jones, Winslow, secretary. The area covered by the membership extends from the Consolidated Ute Agency with headquarters at Ignacio, Colo., through the Navajo country to Truxton Canyon Agency at Valentine, on the west. To date, there are twenty members and six honorary members. The purposes of the society are to promote cooperation among service physicians and to enhance the value of their services to the government. All physicians and dentists of the U. S. Indian Service are eligible for membership. A meeting of the society was held at Fort Defiance, October 10.

INDIANA

Dean Henshaw Addresses Physicians: At a meeting of the Hendricks County Medical Society in Danville, Frederic R. Henshaw, D.D.S., dean of the Indiana University School of Dentistry, spoke on the relation of medicine to dentistry.

Good Teeth Council Announces a New Program: The Good Teeth Council for Children announces a new program, as a major part of which, a dental health course in the form of six lectures has been placed in the extension courses of Indiana and Butler universities.

IOWA

Alumni Association Holds Meeting: The twenty-sixth annual meeting of the Alumni Association of the College of Dentistry, University of Iowa, was held at the college, November 10. G. A. Lundquist, professor of dental pathology at Northwestern University, spoke on "The Physiological Basis for the Treatment of So-Called Pyorrhea."

Dr. Drain Elected: C. L. Drain has been elected a member of the board of directors of the Good Teeth Council for Children.

Dr. T. S. Speidel on Faculty of University of Tennessee: T. S. Speidel has been appointed assistant professor of orthodontia at the University of Tennessee. Dr. Speidel received his D.D.S. degree in 1929 and his M.S. in orthodontia in 1932.

University of Iowa Adds New Members to Staff: New members of the instructional staff at the University of Iowa are C. K. Reger, '34, in the department of prosthetic and crown and bridge technic, and Virgil Cheyne, '33, in the department of pediodontia. Dr. Cheyne completed a year at Forsyth Dental Infirmary, Boston, prior to returning to Iowa.

KANSAS

State Cancer Program: Plans for an educational program against cancer were recently adopted by the Kansas Federation of Women's Clubs at a meeting addressed by Earle G. Brown, secretary of the state board of health and state chairman of the American Society for the Control of Cancer.

MASSACHUSETTS

Tribute to Dr. Cushing: A life size relief in bronze of Harvey Cushing, formerly Moseley professor of surgery at Harvard University Medical School, was presented to the medical school in November by a group of pupils, friends and associates. A bronze medallion in reduction of the original medallion has been purchased by the Boston Museum of Fine Arts. Both the medallion and the bronze relief are the work of Paul Adrian Brodeur, Wellesley Hills. Dr. Cushing is at present Sterling

professor of neurology at Yale University School of Medicine, New Haven.

Committee on Research in Dental Medicine: A committee on research in dental medicine comprising seven representatives of the faculty of arts and sciences and the medical and dental schools has been appointed at Harvard University. The committee has been given general supervision over research in the dental school. Its purposes will be to promote important dental research, act as a clearing house for research that is important to other fields and provide official contacts through which the dental school can readily get assistance for its research problems that overlap those of other departments. A grant from the Milton Fund has been given to the committee for work on its first problem, which will deal with the effects of nutrition on teeth and their supporting structures. Members of the new committee are Elmer P. Kohler, Ph.D., Abbott and James Lawrence professor of chemistry; Alfred C. Redfield, Ph.D., professor of physiology and director of the biologic laboratories; Simeon B. Wolbach, Shattuck professor of pathologic anatomy and consulting pathologist to the Cancer Commission of Harvard University; Walter B. Cannon, George Higginson professor of physiology; Percy R. Howe, D.D.S., Thomas Alexander Forsyth professor of dental science, and instructor in pathology, Harvard Medical School; Lawrence W. Baker, D.M.D., professor of orthodontia, and George P. Matthews, D.M.D., instructor in anatomy. Leroy M. S. Miner, dean of the dental school, will serve as a member *ex officio* of the committee.

MICHIGAN

Professorship for Dr. Ward Established: The board of regents of the University of Michigan has established a Jonathan Taft professorship in dentistry for Marcus L. Ward, who retired as dean of the school of dentistry in August. The professorship, which takes its name from that of the first dean of the school, was given to Dr. Ward to enable him to devote his time to teaching and special research.

NEBRASKA

Edwin A. Litchfield New President: The Nebraska State Dental Society has selected Edwin A. Litchfield, Omaha, to direct the organization for the term 1934-1935.

NEW JERSEY

Allied Professions Conference: Representatives of the Medical Society of the State of New Jersey, the New Jersey State Dental Society, the New Jersey Pharmaceutical Association and the New Jersey State Nurses' Association recently perfected an organization to be known as the Conference of Allied Medical Professions of the State of New Jersey. The purpose of this society is to provide a medium for discussing matters of common interest to the various groups. It is planned to foster the organization of county and district groups. Meetings are to be held at least once a year and other meetings may be called by the chairman or by action of the conference.

Resolutions by the New Jersey Dental Board: The following resolution has been passed by the New Jersey Dental Board: "Resolved, that on and after June, 1937, this Board will accept as candidates, graduates of only the following dental schools: College of Dentistry, Howard University; College of Dentistry, University of Illinois; Harvard University Dental School; Tufts College Dental School; New York University, College of Dentistry; School of Dental and Oral Surgery of Columbia University; School of Dentistry, University of Buffalo; School of Dentistry, Western Reserve University; College of Dentistry, Ohio State University; University of Pennsylvania Dental School; Dental Department, Meharry Medical College. And that additional dental schools from time to time be either added or deleted from this list by action of the board, as circumstances may dictate."

George B. Winter Lecture: At a special meeting of the Hudson County Dental Society held in his honor, George B. Winter, of St. Louis, President-Elect of the American Dental Association, gave a lec-

ture, by means of motion picture films, which described in detail the technic of removal of the mandibular third molar.

NEW YORK

Dr. Seldin Honored: The board of governors of the International Anesthesia Research Society recently voted to present Harry M. Seldin with a silver trophy shield, duly inscribed in commemoration and appreciation of his efforts in the development of the organization and teaching of the specialty, and for the excellent effort he has put forth recently in publishing his textbook. The presentation was made at the Annual Dinner of the Society in Boston, Mass., October 18.

Exhibits for the New York Dental Centennial: The New York Dental Centennial, aside from marking the centenary of the organization of the first dental society in the world, recognizes also the bicentenary of the first record of a dentist in this country; James Reading and James Mills being mentioned as contemporaries of this period, and the first dentists to practice in New York City.

OHIO

Editors Resign: W. L. Wylie and W. M. Gardner have resigned as editor and associate editor, respectively, of the *Bulletin of the Cleveland Dental Society.*

Dr. Lupton Appointed Bulletin Editor: With the November issue of the *Bulletin of the Cleveland Dental Society,* John C. Lupton became editor. He will be assisted by L. E. Cooke, G. J. James and Edward Reiter as associate editors. A fifth member will be named at a later date.

Notes of Western Reserve University Dental School: Dean Casto addressed the past presidents of the Ohio State Dental Society in Columbus, November 19. G. Y. Hildebrand, L.D.S., D.D.S., Ph.D., professor of dentistry at the Royal Carolyn Institute of Surgery, Stockholm, Sweden, was a guest of the school for two days during the past month.

TENNESSEE

Membership for 1934: The Tennessee State Dental Association records the greatest membership in the history of the state. In the past year, the membership has increased practically 125, the state membership roll now containing over 560 names.

VIRGINIA

Recognition of Examination: To date, the following states permit their licensing authorities to recognize the certificate of the National Board of Dental Examiners, and have outlined provisions for permitting the recognition of the certificate: Nebraska, Iowa, Pennsylvania, Illinois, Delaware and Connecticut. Several other states are at present rewriting or revising their dental laws, and expect to include a provision regarding the acceptance of the certificate.

News Notes from the Medical College of Virginia, Richmond: At the ninety-seventh session of the Medical College of Virginia, which opened September 11, the enrollment was as follows: medicine, 336; dentistry, 100; pharmacy, 71; nursing, 134. Holmes T. Knighton has joined the dental school as instructor in operative dentistry. Dr. Knighton received his D.D.S. from Tulane University, and has had two years as a Rockefeller fellow in Dental Research at the University of Rochester. Hubert A. Fee has accepted an appointment in the dental school as associate in operative dentistry. Dr. Fee received his B.A. degree from the University of Wisconsin and his D.D.S. from the University of Minnesota.

WISCONSIN

Dr. Holz Appointed City Dentist: W. J. Holz was appointed city dentist recently by the city health commissioner of Racine. This position was open owing to the recent resignation of H. Costello.

Past Presidents Club Meeting: At the last annual session of the state society, twenty-one past presidents were present of the twenty-four listed in the register of dentists issued by the state board of dental examiners.

FOREIGN

Bar Sale of Dinitrophenol: Changes in the Food and Drugs Act to correct dis-

crepancies between it and the Proprietary or Patent Medicine Act were enacted by the recent federal parliament and will go into effect January 1, according to the *Canadian Medical Association Journal*. The principal change was the insertion in the Food and Drugs Act of a list of nearly forty diseases for which remedies cannot be sold. The journal points out that since obesity is one of the conditions listed, the sale of dinitrophenol would appear to be barred.

Ramon y Cajal Passes Away: The passing of Santiago Ramon y Cajal in Madrid, Spain, October 17, at the age of 82, removes from the scientific world the greatest scientist produced by that country and a world figure, who made notable contributions to anatomy, particularly the finer histology of the central nervous system. The International Medical Congress medal was awarded Cajal in 1903 and he received the Helmholtz Prize and finally the Nobel Prize in 1906, being the only Spaniard to receive this award in any field of science.

GENERAL

Importations of Radium: During the past ten years, the United States has imported less than one-third of a pound of radium, for which more than $6,000,000 has been paid. Radium is one of the few commodities that has not been affected by economic conditions, according to the U. S. Department of Commerce. In fact, the heaviest importations have been made since 1929. Imports were fairly steady during the past ten years at from 125 to 170 grains valued at from $400,000 to $575,000 per annum until 1930. In that year, the amount increased to 260 grains, valued at $925,000, the largest amount ever imported in one year. In 1933, 179 grains valued at $576,000 was imported at an average invoice price of $3,217 per grain, and during the first seven months of the current year $400,000 worth was purchased abroad, it was stated. Most radium imports come from Belgium, which controls the world's principal supply in the Belgian Congo, but smaller consignments are received from Canada, where radium ore was discovered in 1930, and elsewhere.—*J.A.M.A.*, Oct. 13, 1934.

Hygiene Association Withdraws Sponsorship of Film: The American Social Hygiene Association announces that it has withdrawn its sponsorship of the commercially produced film "Damaged Lives," which deals with syphilis in family life. Dr. William F. Snow, New York, general director of the association, states that apparently it has been impossible for the owner of the film, the Weldon Pictures Corporation, to control undesirable and unauthorized activities of distributors and exhibitors in the local advertising and showing of the film. The association has notified the firm that the name of the American Social Hygiene Association must be removed from the film and all prints of the lecture film dealing with syphilis, which was shown jointly with the picture.—*J.A.M.A.*, Nov. 3, 1934.

Dental Practice Acts: Revocation of License for Self-Laudatory Advertising: The defendant, Waller, a licensed dentist, distributed circulars in which he claimed to be the only dentist in the Panhandle of Texas "doing Professional Denture work." The district court, Potter county, Texas, revoked Waller's license under a provision of the Texas dental practice act authorizing the revocation of a license if the licentiate was guilty of "any deception or misrepresentation for the purpose of soliciting or obtaining business." Waller appealed to the court of civil appeals of Texas at Amarillo. The judgment canceling Waller's license, said the court of civil appeals, rested on an accusation, charge and evidence that may not be made the legal basis for depriving a citizen of Texas of the right to labor and enjoy the fruits of that labor in his chosen profession, even though all that was charged and proved against him be true. It was not claimed that any act of Waller in any way affected the health, safety, morals, comfort, or general welfare of the public, or any of its members; nor that Waller was not able to do proficiently and expertly everything that he said he could do; nor that anybody was misled or deceived to his injury, or could

have been, by the statements made by Waller. Those statements, continued the court, amounted to no more than a claim that he was better equipped than his professional brethren to do a certain class of dental work and that he was doing such work better than they. Being able to do precisely the character of work he advertised, questioned the court, who could be injured by the representation that he could do it better than others, unless it was his competitors who lost business to him by reason of his statements? If only his competitors would be thus affected, no contention could be made that legislative authority existed under the police power to cancel a professional license on any such narrow and selfish ground. The Texas court found itself in accord with the views expressed by the Supreme Court of Colorado in *Chenoweth v. State Board of Medical Examiners,* 57 Colo. 74, 141 P. 132, in which the Colorado court held unconstitutional a provision of the medical practice act of Colorado authorizing the revocation of a physician's license for "causing the publication and circularization of an advertisement relative to any disease of sexual organs," on the ground that the provision had no reasonable relation to the public health and comfort, or to the safety or welfare of society and hence could not be justified under the exercise of police power. The provision of the dental practice act under consideration, as interpreted by the lower court, said the court of civil appeals, would permit the revocation of a license because of a simple misrepresentation to obtain business, even though such misrepresentation amounted to no more than "puffing one's wares" or "big talk," and even though such misrepresentations in no way affected adversely the health, morals, safety or welfare of the public. The right to practice a profession has been called a property right, but it is more, continued the court. To obtain a license and proficiency requires the expenditure of money and years of preparation. Such right is the capital stock of its possessor from which dividends are expected to protect him from the infirmity of old age and to provide his family with the comforts of life. To cancel a professional license is to take away the entire capital stock of its possessor and to leave him in most instances the equivalent of a bankrupt. No legislature should be allowed to prescribe the infliction of such a penalty except by a law clear and unmistakable in its terms and which respects the interests of society and its members. Because, concluded the court, no valid legal basis existed, under the accusatory portions of the complaint, for the judgment rendered by the trial court, that judgment was reversed and the cause remanded.—*Waller v. State (Texas),* 68 S. W. (2d) 601.—*J.A.M.A.,* Oct. 13, 1934.

Dental Practice Acts: Filing of Charges Condition Precedent to Revocation Proceedings: The Illinois Department of Registration and Education, without any formal charges having been first filed with it, instituted revocation proceedings against Kalman, Niedermeyer and another, all licensed dentists employed by the Chicago Dentists. The department served notice on each of the dentists that on a stated day it would investigate his actions to determine whether or not he had obtained money by false or fraudulent representations or had been guilty of dishonorable conduct or of certain other unprofessional acts. The three dentists then filed a bill in the superior court, Cook County, to enjoin the department and its dental committee from proceeding further in the matter. The court sustained a demurrer interposed by the defendants and dismissed the bill, whereupon Niedermeyer appealed to the Supreme Court of Illinois. The Illinois Civil Administrative Code, as amended, defines the procedure to be followed in revoking a license to practice dentistry, as also does the Illinois dental practice act. The Civil Administrative Code provides that the department "may upon its own motion and shall upon the verified complaint in writing of any person" initiate revocation proceedings. On the other hand, the dental practice act, prior to February 1933, provided, in part, as follows: "The board (meaning the Department of Registration), when written charges have been filed with its secretary, and seem sustained

by proof, shall fix a time and place for the examination of a person so charged and shall give written notice to the said person of the time and place and furnish him with a copy of the charges. . . ." For the reasons stated in *Schireson* v. *Walsh,* 187 N. E. 921 (*J.A.M.A.,* Aug. 4, 1934, p. 367) the Supreme Court held sections 60(a)-61(l) of the Civil Administrative Code unconstitutional as applied to dental practitioners. The department, the court held, in proceedings to revoke a license to practice dentistry, must follow the procedure laid down in the dental practice act as it existed at the time of the alleged professional misconduct on the part of Niedermeyer, namely, prior to February. The right to practice dentistry, said the Supreme Court, is a valuable right, a property right within the due process of a law clause of the constitution. Revocation of a license to practice dentistry not only carries with it disgrace and humiliation, but also deprives the licentiate of his means of earning his livelihood. In a proceeding of this nature, due process of law requires a definite charge, adequate notice and a full, fair and impartial hearing. While it is not necessary that charges of professional misconduct should be drawn with the same accuracy and certainty as an indictment or information in a criminal case or with the refinements of pleadings in courts of record, yet such charges should be so drawn as to bring the alleged act of misconduct clearly within the purview of the statute and should specify the time and place when and where such prohibited act was committed. The right to proper notice and a sufficient and explicit charge is not procedural but substantive. The supposed charge in this record shows that the contemplated hearing was a hearing in the nature of an inquisition similar to an investigation by a grand jury. This is not the hearing that is provided by the statute. Neither the dental committee nor the department has the power, under the statute, to originate or prefer charges against a dental practitioner. The charges against Niedermeyer, in order to confer jurisdiction on the dental committee or the department, should have been in writing, filed with the secretary of the committee, and should have contained direct, positive and specific allegations based on the alleged commission by Niedermeyer of some of the acts prohibited by the dental practice act. Under the notice purporting to contain the charges against Niedermeyer and served on him by the department, concluded the court, neither the department nor its dental committee had jurisdiction to conduct the alleged investigation against him or to enter any order revoking or suspending his license. The Supreme Court, therefore, directed the superior court to overrule the demurrer to the bill.—*Kalman v. Walsh (Ill.)* 189 N. E. 315.—*J.A.M.A.,* Nov. 3, 1934.

Deaths

Allen, Norman H., Brooklyn, N. Y.; Maryland College of Dentistry, 1879; died recently.

Bermas, Milton J., Brooklyn, N. Y.; The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1914; died September 30; aged 41.

Carpenter, Elliott R., Cotuit, Mass.; University of Pennsylvania Dental School, 1891; died October 19.

Collins, Horace E., San Diego, Calif.; died in September.

Herrick, Charles Alexis, Stockton, Calif.; College of Dentistry, University of California, 1890; died September 3; aged 61.

Howard, Edgar P., Harrisonburg, Va.; Medical College of Virginia, 1924; died in August; aged 33.

Jansen, William, Brooklyn, N. Y.; New York College of Dentistry, 1905; died August 29.

Kaplan, Nathan M., Chicago, Ill.; Northwestern University Dental School, 1915; died November 5; aged 45.

Kelly, Norman D., Los Angeles, Calif.; College of Physicians and Surgeons, School of Dentistry, 1898; died recently.

LeCron, S. Leslie, Baltimore, Md.; National University, College of Dentistry, 1882; died September 29.

Mathew, Lawrence Frank, Cleveland,

Ohio; Western Reserve University, 1928; died August 16; aged 32.

McGuire, Stuart, Portland, Ore.; North Pacific College of Oregon, School of Dentistry, 1915; died September 16; aged 49.

McNinch, Samuel W., Marble Rock, Iowa; Northwestern University Dental School, 1898; died August 27.

Miller, Frank E., Cedar Rapids, Iowa; State University of Iowa, College of Dentistry, 1894; died September 9; aged 71.

O'Malley, Martin, Des Moines, Iowa; Des Moines College of Dental Surgery, 1905; died September 11.

Overholt, Edwin M., Chicago, Ill.; Chicago College of Dental Surgery, 1917; died October 11; aged 51.

Schmeckebier, William F., Chicago, Ill.; Chicago College of Dental Surgery, 1902; died October 10; aged 59.

Seaver, Alfred D., Brooklyn, N.Y.; New York College of Dentistry, 1899; died September 26; aged 68.

Stevens, William L., Chicago, Ill.; Northwestern University Dental School, 1889; died October 18; aged 67.

Streeter, M. J., Oakland, Calif.; College of Dentistry, University of California, 1919; died recently.

Swart, Walter R., Astoria, Ore.; North Pacific College of Oregon, School of Dentistry, 1915; died October 7; aged 41.

Tenny, John W., Ponchatoula, La.; died October 22; aged 81.

Tibbits, George F., Chicago, Ill.; Northwestern University Dental School, 1897; died October 29.

Weber, B. A., Des Moines, Iowa; State University of Iowa, College of Dentistry, 1912; died August 27.

MISCELLANY

BOOK REVIEWS

Osteomyelitis, Its Pathogenesis, Symptomatology and Treatment. By Abraham O. Wilensky, A.B., M.D., F.A.C.S. Published by the Macmillan Company, New York City, 1934.

"Of the making of books there is no end." If all books were as this one, there would be no regret that the quotation is true. Wilensky's "Osteomyelitis" is a good book. In its class, it is a great book. It is scholarly and thorough. As the first book on any subject should do, this volume gives a history of the disease beginning with the Sanskrit period. The old literatures, those of Egypt, Greece and Rome, have been searched, and those intervening. The volume represents a vast amount of labor and it contains a vast amount of knowledge. It is a reference book primarily, not a textbook for the library or the school room. It is for the graduate student, the practitioner who wants a compact study to which he can go to stabilize his thinking and justify his labor. Dr. Wilensky is a surgeon of many years' experience and brings the practitioner's mental attitude to the scholar's task; he misses no phase of the disease or region where it can occur. He gives fifty-one pages to osteomyelitis of the jaws. The only criticism one can offer is the use of radiology and roentgenology as synonyms, a criticism that seems too small to be mentioned in the description of such a work, but yet which is confusing and becoming more contrary in definition daily. The volume contains 454 pages. It begins with a short preface which is followed by a thorough table of contents of twenty-three pages. The book ends with five and one-half pages of name index and ten and one-half pages of subject index. Each chapter ends with a gratifying bibliography. *In toto*, the book is a great accomplishment.

T.

The Practice of Absorption Spectrophotometry with Hilger Instruments. By F.

Twyman, F.Inst.P., F.R.S.; and C. B. Allsopp, M.A., Ph.D,; Adam Hilger, Ltd., London, England. Second edition, June, 1934. 132 pages, with 45 plates and illustrations.

Adam Hilger, Ltd., has rendered a service to those engaged in the practice of absorption spectrophotometry and those interested in the application of this difficult technic by the publication of this volume. While the practice of absorption spectrophotometry has little direct interest for dentists, the application of this technic has revealed interesting information that bears on dental problems.

For example, the etiology of mottled enamel has long worried dentists, until the results of Churchill, published several years ago, revealed by spectrographic examination the relation between this disfigurement of the teeth and the fluorine content of water.

The value of spectrophotometry as a tool for research is evident when it is appreciated that the instrument reveals the presence of extremely small amounts of dissolved substances, and the fact that chemical methods for the determination of the extremely minute amounts of fluorine which occur in drinking water are not entirely satisfactory.

With those interested in the research aspects of dentistry, and a possible method of their solution, by means of spectral methods, the book will find a useful place. The present edition of this book is divided into two parts, the first dealing with the theory of absorption, the second a detailed consideration of the technic required in the spectrophotometric absorption of light. Of some interest is the value of the method in the determination of vitamins A and D by physical methods. Indeed, the romantic story of the chemical separation of these vitamins is closely bound up with the use of spectrophotometry. Those who are acquainted with physics and physical chemistry, and the part that they play in the solution of dental problems, will find much of interest and value in the book.

SAMUEL M. GORDON.

IMPORTANT ACTION

The following statement has been submitted to the officers of the component societies of the American Dental Association for the information of the membership:

The exhaustive studies that have been made of health insurance laws and plans in the thirty-seven countries in which they are in use have demonstrated that these plans for providing medical and dental care are not applicable to the needs of our country.

During this month, important conferences have been held in New York, Washington, D. C., and Chicago from which much instructive information was obtained and satisfactory contacts were made.

November 20, the Ad Interim Committee and the Economics Committee of the American Dental Association met with a special committee recently appointed by the Board of Trustees of the American Medical Association to formulate plans for future activity leading to closer cooperation in all questions of mutual interest.

As a result of these studies and conferences, the Economics Committee prepared the following resolution, which was adopted by the Ad Interim Committee of the Board of Trustees of the American Dental Association:

The American Dental Association is opposed to the enactment of legislation along the lines of so-called compulsory health insurance until the health professions are thoroughly satisfied that the interests of the public and the professions are properly safeguarded.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association, New Orleans, La., November 4-8.

American Dental Society of Europe, London, July 31-August 3.

Belgian National Dental Congress, Brussels, August.

Dental Protective Association of the United States, Chicago, December 17.

Five State Postgraduate Clinic, Washington, D. C., March 18-20.

Great Lakes Association of Orthodontists, Detroit, Mich., January 28-29.

Midwinter Clinic of the Chicago Dental Society, February 18-21.

National Board of Dental Examiners, January 11-12; May 24-25.

New York Dental Centennial, New York City, December 3-7.

New York State Dental Hygienists Association, Saranac, June 12-15.

Rocky Mountain Midwinter Clinic, Denver, January 9-12.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

District of Columbia at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

STATE SOCIETIES

February

Minnesota, at Minneapolis (26-28)

April

Mississippi, at Jackson (22-24)

Wisconsin, at Milwaukee (16-18)

May

Georgia, at Atlanta (13-15)

Illinois, at Quincy (14-16)

June

New York, at Upper Saranac (12-15)

*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

STATE BOARD OF DENTAL EXAMINERS

California, at San Francisco, December 3. K. I. Nesbitt, 450 McAllister St., San Francisco, Secretary.

Colorado, at Denver, December 4-8. N. C. Gunter, Pueblo, Secretary.

Delaware, at Wilmington, January 23-24. W. S. P. Combs, Middleton, Secretary.

Iowa, at Iowa City, December 17-20. Hardy F. Pool, Mason City, Secretary.

New Jersey, at Trenton, December 3-8. John C. Forsyth, 148 W. State St., Trenton, Secretary.

North Dakota, at Fargo, January 8-11. W. E. Cole, Bismarck, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, December 4-8. W. A. McCready, 1115 Highland Bldg., Pittsburgh, Secretary.

Rhode Island, at Providence, December 4-6. Albert L. Midgley, 1108 Union Trust Bldg., Providence.

Wisconsin, at Milwaukee, December 10-14. S. F. Donovan, Tomah, Secretary.

GEORGIA DENTAL ASSOCIATION

The sixty-seventh annual meeting of the Georgia Dental Association will be held at the Ansley Hotel, Atlanta, May 13-15.

R. H. MURPHY, *Secretary,*
920 Georgia Casualty Bldg.,
Macon.

WISCONSIN STATE DENTAL SOCIETY

The next meeting of the Wisconsin State Dental Society will be held at the Schroeder Hotel, Milwaukee, April 16-18.

E. E. PARKINSON, *Secretary,*
104 King St.
Madison.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the North Dakota State Board of Dental Examiners will be held January 8-11 at the Gardner Hotel, Fargo. Applications, with necessary fee, must be in the hands of the secretary at

least ten days prior to the date of examination. Address all communications to

W. E. COLE, *Secretary,*
Bismarck.

ROCKY MOUNTAIN MIDWINTER CLINIC

The Rocky Mountain Midwinter Clinic of the Denver Dental Association will be held January 9-12, at the Cosmopolitan Hotel in Denver.

ALBERT P. HORTON, *Secretary,*
1550 Lincoln St.,
Denver.

FIVE STATE POSTGRADUATE CLINIC

The District of Columbia Dental Society will act as host to the Five State Postgraduate Clinic to be held March 18-20, at Wardman Park Hotel, Washington, D. C. The five states embraced are: Virginia, West Virginia, Maryland, Delaware and North Carolina.

J. F. MANLEY, *Chairman,*
Publicity Committee,
1726 Eye St. N. W.,
Washington, D. C.

GREAT LAKES ASSOCIATION OF ORTHODONTISTS

The annual meeting of the Great Lakes Association of Orthodontists will be held January 28-29 in the Hotel Statler, Detroit, Mich.

RALPH P. HOWARTH, *Secretary,*
1140 Hanna Bldg.,
Cleveland, Ohio.

ANNUAL COMBINED MEDICAL-DENTAL MEETING

The Fourth Annual Combined Medical-Dental Meeting will be held at the Hotel Pennsylvania, New York City, December 3, with morning, afternoon and evening sessions. Participation in the program will be equally divided between the two professions. A dinner will precede the evening meeting. The object of the meeting is to call attention of the members of both professions to the close relationship existing between systemic and dental diseases and to stimulate more interest and greater cooperation between the practitioners in the care of their patients, to the end that the public shall receive better service.

VACANCY FOR INTERNS

A vacancy for two interns will be available in Mary Immaculate Hospital, Jamaica, Long Island, N. Y., July 1, 1935. A competitive examination will be held during the Christmas holidays. For application blanks, address

SR. M. SUITBERTHA, O. P.,
Superintendent.

CHICAGO DENTAL SOCIETY MIDWINTER CLINIC

The Chicago Dental Society Midwinter Clinic will be held at the Hotel Stevens February 18-21. The Stevens provides ample room for the various section meetings, the numerous clinics and the commercial exhibits, the latter being housed in a hall occupying 32,000 square feet. Headlining the social aspects of the meeting are the dinner dance, the annual frolic and the ladies' luncheon and entertainment. Special groups, fraternities and college alumni associations will also stage affairs for their members. All members of the American Dental Association are invited to attend.

D. W. PHILLIPS, *Chairman,*
Publicity Committee.

DENTAL DEPARTMENT OF MONTEFIORE HOSPITAL

The Dental Department of Montefiore Hospital, New York City, will hold a meeting December 18 as part of the scientific program of the fiftieth anniversary of the founding of the hospital. Members of the medical and dental professions of the metropolitan area are invited to attend. E. M. Bluestone, M.D., Leo Winter, M.D., D.D.S., and Bissell B. Palmer, D.D.S., will appear on the evening program.

H. HINENBURG, *Assistant Director,*
Montefiore Hospital,
Gun Hill Road, near Jerome Ave.

NEW YORK STATE DENTAL HYGIENISTS' ASSOCIATION

The fifteenth annual meeting of the Dental Hygienists' Association of the State of New York will be held in Saranac, June 12-15.

RAE SCHWARTZ, *Chairman,*
Publicity Committee,
2685 University Ave.,
New York City.

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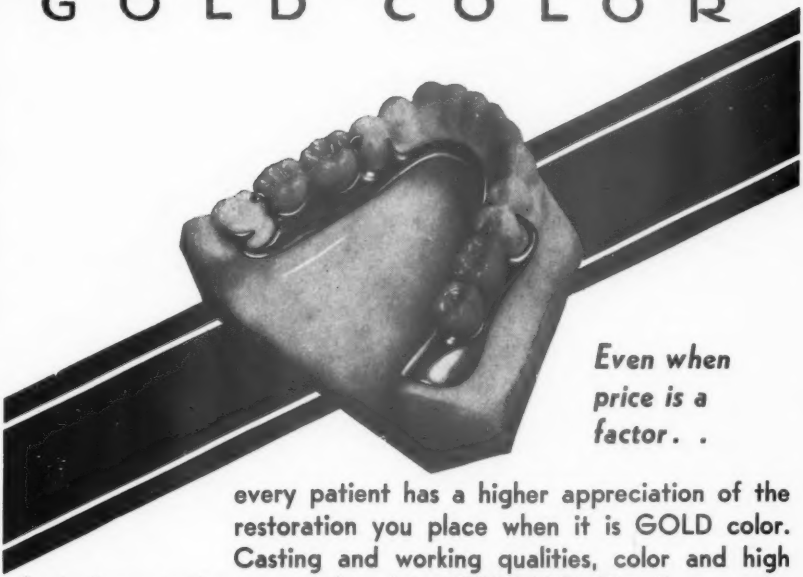

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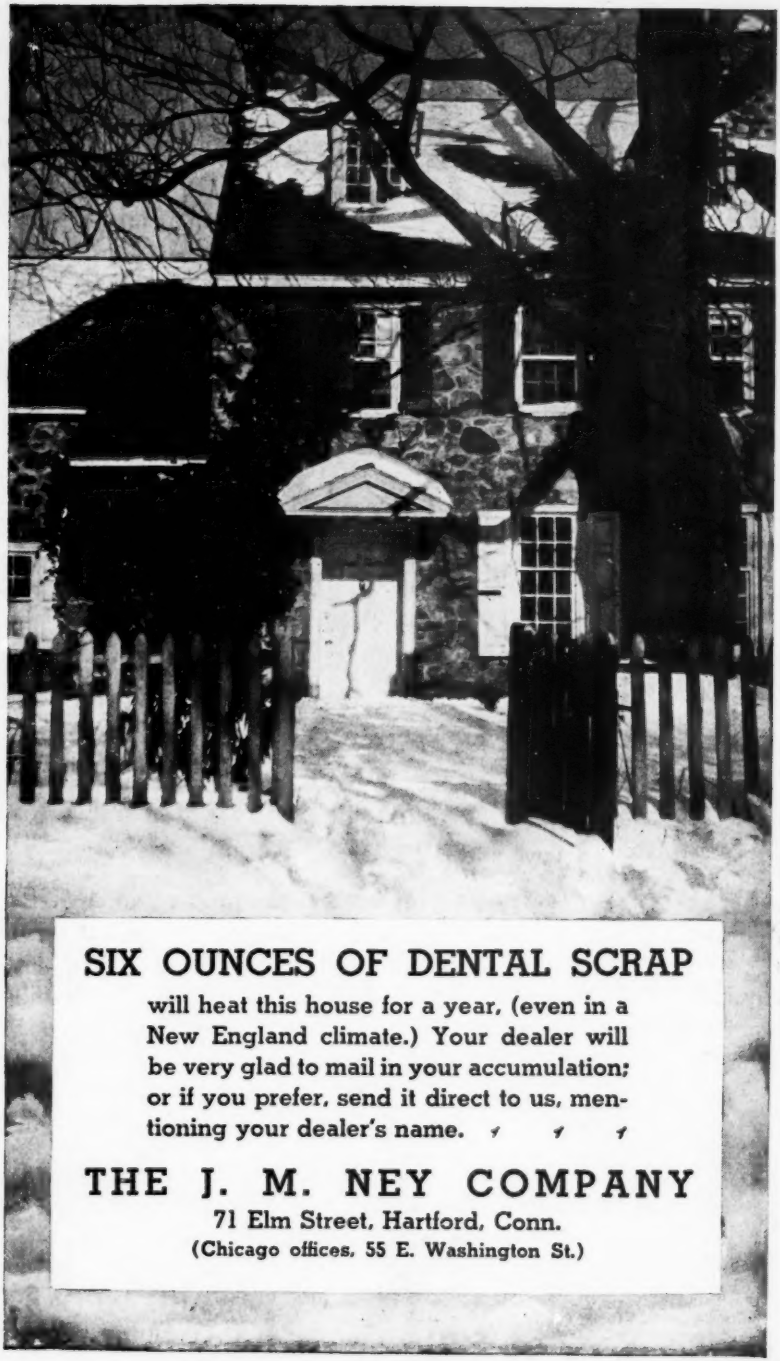

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